GMSIH, HPRIM and JAHIS

Integrating the Healthcare Enterprise

Laboratory Technical Framework

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Volume 2 (LTF-2) Transactions

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Revision 1.2 – Final Text

February 27, 2005

Contents

1 Introduction

This document is Volume 2 of "IHE Laboratory Technical Framework".

Volume 1 provides the high-level view of this framework, describes the Integration Profiles, defines the Actors and shows the sequencing of transactions between them.

This document, Volume 2, provides the detailed description of each new transaction introduced by the Laboratory Technical Framework: Roles of the actors, trigger events, messages exchanged, standards employed, triggered actions.

1.1 Rationale for the choice of the standard to be used

For the new messages defined in this Volume 2 the possible standards considered were:

- HL7 V3
- HL7 V2.3.1
- HL7 V2.4
- HL7 V2.5

At this point in time, HL7 V3 is not ready for implementation in systems, and HL7 V2.5 is the only available version that supports both specimen and container. Moreover, domain experts view it as the best available version for the laboratory profile.

For this reason the IHE Laboratory committee has chosen to base this volume on HL7 V2.5.

The Laboratory Technical Framework uses two transactions that have already been defined in the Radiology Technical Framework: "Patient Registration [1]" and "Patient Update [12]". These two transactions are adopted without change, with their messages using HL7 V2.3.1. They are not described in this document, and the reader is referred to the "Radiology Technical Framework Volume 2". However, the transaction "Patient Update [12]" triggers a specific action from the Order Filler that sends a specific message of transaction LAB-4 to the Automation Manager (See chapter 7 of this document).

Since we have at least two transactions using the pipe encoding mechanism, this encoding mechanism is required for the messages described in this volume. The XML encoding of these messages is optional and may be specified in national extensions.

2 Conventions

2.1 The generic IHE Transaction Model

See the "IHE Radiology Technical Framework" Volume 2, chapter 2.1

2.2 HL7 Profiling Conventions

The messages used by each transaction are described in this document using static definitions of "HL7 constrainable message profiles". Refer to HL7 v2.5 section 2.12.6. The static definition of each message is represented within tables. At the message level, a table represents the message structure and its definition in terms of segments. At the segment level, a table details one segment and its definition in terms of fields.

2.2.1 Static definition - message level

The table describing a message contains 5 columns:

- Segment: gives the segment name, and places the segment within the hierarchy of the message, as designed by HL7: i.e. delimiting optional segments with square brackets, and repeatable segments with braces, and using indentation to show the hierarchy.
- Meaning: Meaning of the segment as defined by HL7
- Usage: Coded usage of the segment, as defined by this static definition built for the context of this particular transaction within IHE Laboratory Technical Framework. The coded values used in this document are:

  R: Required: A compliant sending application shall populate all "R" elements with a non-empty value. A compliant receiving application shall process (save/print/archive/etc.) or ignore the information conveyed by required elements. A compliant receiving application shall not raise an error due to the presence of a required element, but may raise an error due to the absence of a required element.

  RE: Required but may be empty. The element may be missing from the message, but shall be sent by the sending application if there is relevant data. A conformant sending application shall be capable of providing all "RE" elements. If the conformant sending application knows the required values for the element, then it shall send that element. If the conformant sending application does not know the required values, then that element may be omitted.

  Receiving applications will be expected to process (save/print/archive/etc.) or ignore data contained in the element, but shall be able to successfully process the message if the element is omitted (no error message should be generated if the element is missing).

  O: Optional. The usage for this field within IHE Laboratory Technical Framework has not been defined yet

  C: Conditional. This usage has an associated condition predicate. (See HL7 v2.5 section 2.12.6.6 "Condition Predicate").

If the predicate is satisfied: A compliant sending application shall always send the element. A compliant receiving application shall process or ignore data in the element. It may raise an error if the element is not present.

If the predicate is NOT satisfied: A compliant sending application shall NOT send the element. A compliant receiving application shall NOT raise an error if the condition predicate is false and the element is not present, though it may raise an error if the element IS present.

X: Not supported. For conformant sending applications, the element will not be sent. Conformant receiving applications may ignore the element if it is sent, or may raise an application error.

- Cardinality: Within square brackets, minimum and maximum number of occurrences authorized for this segment, in this static definition of the message, built for the context of this particular transaction within IHE Laboratory Technical Framework.
- HL7 chapter: Reference of the HL7 v2.5 chapter that describes this segment.

Simplification:

For a better readability of the table, the usage "X" is not shown at the message level: if a segment is "not supported" by an IHE profile, it simply doesn't appear in the table representing the message structure.

Table 3.2-1: Example: Initial segments of a message description

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message Header	R	[1..1]	2
[	--- PATIENT begin		[1..1]	
PID	Patient Identification	R	[1..1]	3
[	--- PATIENT VISIT begin		[1..1]	
PV1	Patient Visit	RE	[0..1]	3

2.2.2 Static definition - segment level

The table describing a segment and its definition in terms of fields contains 7 columns :

- **SEQ**: Position (sequence) of the field within the segment.
- **LEN**: Maximum length of the field
- **DT**: Field Data Type
- **Usage**: Usage of the field in this particular context of IHE Laboratory Technical Framework. Same coded values as in the message level: R, RE, C, O, X
- **Cardinality**: Minimum and maximum number of occurrences for the field in this particular context of IHE Laboratory Technical Framework. Same meaning as in the message level.
- **TBL#**: Table reference (for fields using a set of defined values)
- **ITEM#**: HL7 unique reference for this field

- **Element Name**: Name of the field.

Simplification :

For a better readability of the table, the usage “O" is not shown at the segment level: All optional fields doooo not appear in the tables. The number in the first column SEQ is the only item of information that provides the exact position of a field within this segment.

Table 3.2-2: Example: The MSH segment description

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	1	ST	R	[1..1]		00001	Field Separator
2	4	ST	R	[1..1]		00002	Encoding characters
3	227	HD	R	[1..1]	0361	00003	Sending Application
…							

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According to HL7 standard, if the value of a field is not present, the receiver shall not change corresponding data in its database. However, if the sender defines the field value to be the explicit NULL value (i.e. two double quotes ""), it shall cause removal of any values for that field in the receiver's database. This convention is fully applied by the Laboratory Technical Framework.

2.3 HL7 Implementation Notes

2.3.1 Network Guidelines

The IHE Laboratory Technical Framework makes these recommendations:

Applications shall use the Minimal Lower Layer Protocol (MLLP) defined in appendix C of the HL7 Implementation Guide.

An application that wants to send a message (initiate a transaction) will initiate a network connection (if one does not already exist) to start the transaction. The receiver application will respond with an acknowledgement or response to query but will not initiate new transactions on this network connection.

2.3.2 Message Granularity

A message is generated from one trigger event in the real world. Therefore a message is related to one single order or to one order group:

A LAB-1 message is related to one placer order or to one placer order group.

A LAB-2 message is related to one filler order or to one filler order group.

A LAB-3 message is related to one (filler and placer) order or to one order group.

A LAB-4 or a LAB-5 message is related to one work order.

2.3.3 Acknowledgement Modes

For this cycle of the IHE Laboratory Technical Framework, applications that receive HL7 messages shall send acknowledgements using the HL7 original acknowledgement mode as defined in HL7 v2.5 chapter 2, 2.9.2. The enhanced acknowledgement rules are not supported.

An OML message shall be acknowledged by one single ORL message. An OUL message shall be acknowledged by one single ACK message. These acknowledgements are application-level acknowledgements (i.e. not transport acknowledgements) and must be generated by the receiving application after it has parsed the message and processed its content.

The receiving application shall automatically generate the application-level acknowledgement messages without waiting for human approval of the contents of the message that was received.

2.3.4 ACK: General Acknowledgement Message

This message is defined in HL7 chapter 2

Table 3.3-1: ACK: General Acknowledgement Message

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message Header	R	[1..1]	2
MSA	Message Acknowledgement	R	[1..1]	2
[{ERR}]	Error	C	[0..1]	2

Notes: For the general acknowledgment (ACK) message, the value of MSH-9-2-Trigger event is equal to the value of MSH-9-2-Trigger event in the message being acknowledged. The value of MSH-9-3-Message structure for the general acknowledgment message is always ACK.

The Condition Predicate for using an ERR segment is specified in the transaction chapters.

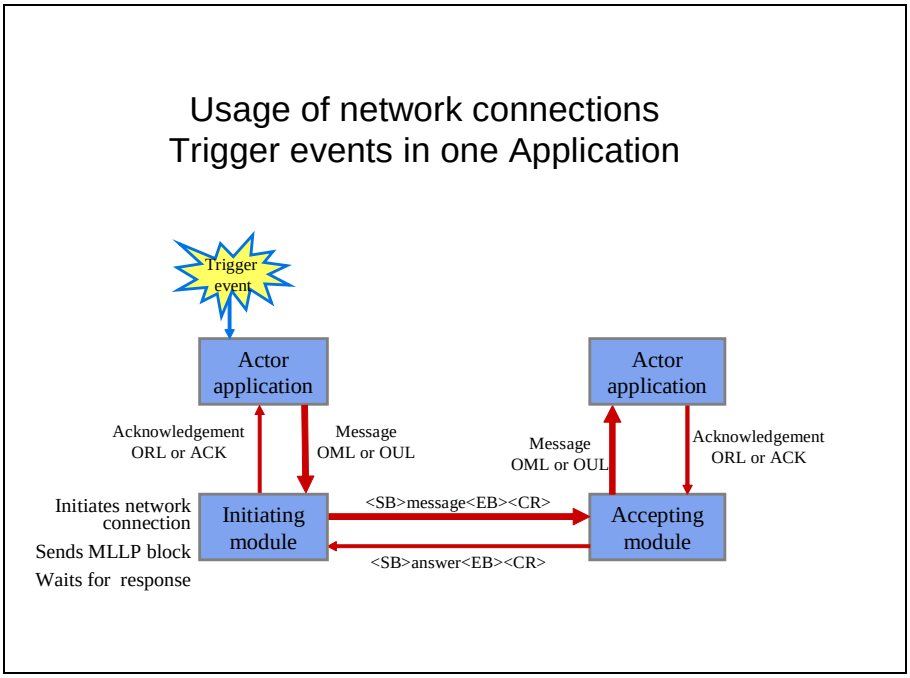
2.3.5 IHE Laboratory Technical Framework acknowledgement policies

From a transactional viewpoint a MLLP (Minimal Lower Layer Protocol) network connection is *unidirectional*. Event-triggered messages flow in one direction and acknowledgement messages related to those event-triggered messages flow in the other direction.

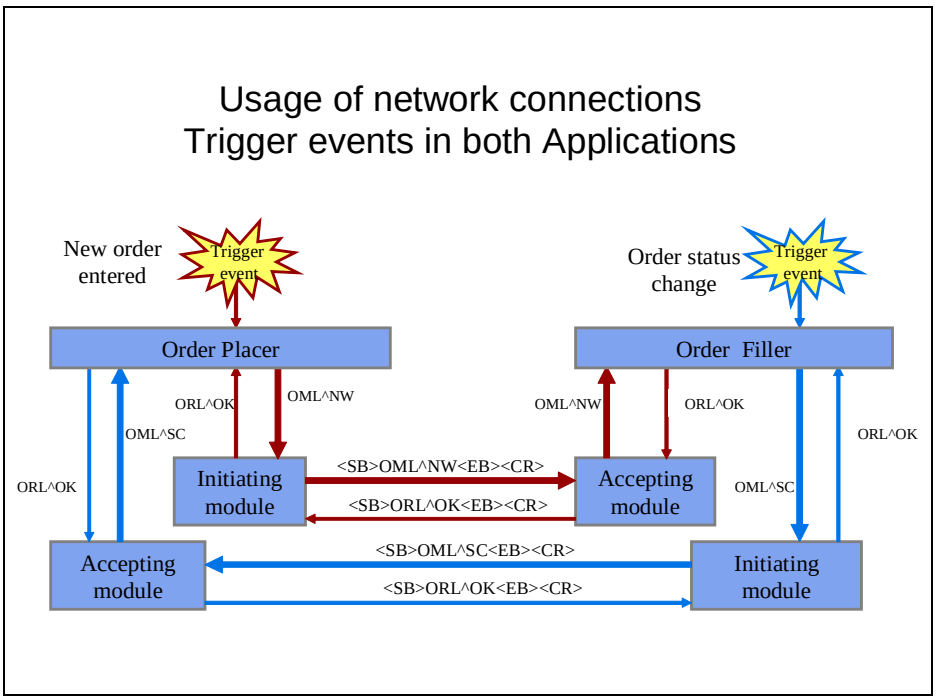
350 The acknowledgement message to an event-triggered message shall be sent *immediately* to the sender on the same MLLP connection that carried the event-triggered message. The receiver of an event-triggered message should assume that the sending application is blocking and send an application-level acknowledgement as soon as possible.

It may take the receiving system a while (seconds, minutes) to acknowledge a message. If the MLLP connection is broken whilst the sending application is still waiting for an acknowledgement, the sending application shall initiate a new MLLP connection and resend the message.

360 The acknowledgement message is an application-level acknowledgement. (Note: HL7 commit/accept acknowledgement messages shall not be used). The application acknowledgement shall only be created by an application that is able to examine a message at the semantic / business-proces level. Intermediate message brokers do not have this capacity and therefore shall not be used to generate the contents of application acknowledgements.



Transactions between 2 applications which contain trigger events on both sides (such as LAB-1) require at least two network connections between the Actors, one for each direction:



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2.3.6 Identifier Data Types

This section describes the IHE constraints of the data types.

2.3.6.1 EI Data Type

The constraints below particularly apply to the following fields: placer group number, placer order number, filler order number and specimen number.

SEQ	LEN	DT	Usage	CARD	TBL#	COMPONENT NAME
1	16	ST	R	[1..1]		Entity Identifier
2	20	IS	C	[0..1]	0363	Namespace ID
3	199	ST	C	[0..1]		Universal ID
4	6	ID	C	[0..1]	0301	Universal ID Type

Component 1 is required. Either component 2 or both components 3 and 4 are required.
380 Components 2, 3 and 4 may be all present.

The EI is appropriate for machine or software generated identifiers. The generated identifier goes in the first component. The remaining components, 2 through 4, are known as the assigning authority; they can also identify the machine/system responsible for generating the identifier in component 1.

Example 1: AB12345^RiversideHospital

Example 2: AB12345^^1.2.840.45.67^ISO

Example 3: AB12345^RiversideHospital^1.2.840.45.67^ISO

IHE restrains the length of the first component to 16 characters. National extensions can extend this length up to a maximum of 199.

IHE recommands to fill component 2 “Namespace ID” in all cases. Particularly when there are several concurrent assigning authorities within the healthcare enterprise, this Namespace ID will indicate which assigning authority provided this number.

This happens for instance, when there are several Order Placer actors within the enterprise, each one assigning placer order numbers and placer group numbers.

Example 4: Placer order number 9876543 and placer group number 777 assigned by the Order Placer actor operated by the Nephrology department.

```
ORC|NW|9876543^Nephro||777^Nephro|...
```

Example 5: Placer order number 9876543 and placer group number 555 assigned by the Order Placer actor operated by the Urology department.

```
ORC|SC|9876543^Urology||555^Urology |...
```

This also commonly happens when there are several Order Filler actors within the enterprise, each one assigning its own filler order numbers and specimen numbers.

Example 6: Filler order number and specimen number assigned by the Order Filler actor operated by the clinical laboratory of cytology.

```
SPM|1|45611^Cytology|...
...
OBR|1|456^Cytology|...
```

2.3.6.2 CX Data Type

The constraints below particurarly apply to the Patient Identifiers (PID segment).

SEQ	LEN	DT	Usage	CARD	TBL#	COMPONENT NAME
1	15	ST	R	[1..1]		ID Number
2	1	ST	O	[0..1]		Check Digit
3	3	ID	O	[0..1]	0061	Check Digit Scheme
4	227	HD	R	[1..1]	0363	Assigning Authority
5	5	ID	RE	[0..1]	0203	Identifier Type Code
6	227	HD	O	[0..1]		Assigning Facility
7	8	DT	O	[0..1]		Effective Date
8	8	DT	O	[0..1]		Expiration Date
9	705	CWE	O	[0..1]		Assigning Jurisdiction
10	705	CWE	O	[0..1]		Assigning Agency or Department

The data type has been constrained because the IHE Framework regards the Assigning Authority and the Identifier Type Code as essential components. The most common value for the Identifier Type Code in PID-3 is “PI”. Other values are defined in Table 0203 of HL7 2.5 section 2.A.14.5.

Example: 12345^^^Saint-John Hospital^PI

3 Common Message Segments for Laboratory Technical Framework

420 This section describes the common message segments used by the transactions LAB-1, LAB-2, LAB-3, LAB-4, LAB-5.

Each table represents a segment. Below the table are commented only the fields for which IHE Laboratory Technical Framework brings some precision on usage. The optional fields are not shown in the table, unless they require a particular comment within the context of the IHE Framework.

3.1 MSH - Message Header Segment

HL7 v2.5: chapter 2 (2.15 Message control)

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

430 **Table 3.1-1 : MSH - Message Header**

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	1	SI	R	[1..1]		00001	Field Separator
2	4	ST	R	[1..1]		00002	Encoding Characters
3	227	HD	R	[1..1]		00003	Sending Application
4	227	HD	R	[1..1]		00004	Sending Facility
5	227	HD	R	[1..1]		00005	Receiving Application
6	227	HD	R	[1..1]		00006	Receiving Facility
7	26	TS	R	[1..1]		00007	Date/Time of Message
8	40	ST	X	[0..0]		00008	Security
9	15	MSG	R	[1..1]		00009	Message Type
10	20	ST	R	[1..1]		00010	Message Control Id
11	3	PT	R	[1..1]		00011	Processing Id
12	60	VID	R	[1..1]		00012	Version ID
14	180	ST	X	[0..0]		00014	Continuation Pointer
15	2	ID	X	[0..0]	0155	00015	Accept Acknowledgement Type
16	2	ID	X	[0..0]	0155	00016	Application Acknowledgement Type
17	3	ID	RE	[1..1]	0399	00017	Country Code
18	16	ID	C	[0..1]	0211	00692	Character Set
19	250	CE	RE	[1..1]		00693	Principal Language of Message
20	20	ID	X	[0..0]	0356	01317	Alternate Character Set Handling Scheme
21	427	EI	RE	[0..*]		01598	Message Profile Identifier

MSH-1 Field Separator, required: The IHE Laboratory Technical Framework requires that applications support HL7-recommended value that is | (ASCII 124).

MSH-2 Encoding Characters, required: This field contains the four characters in the following order: the component separator, repetition separator, escape character, and subcomponent separator. The IHE Laboratory Technical Framework requires that

applications support HL7-recommended values ^~\& (ASCII 94, 126, 92, and 38, respectively).

MSH-4 Sending Facility (HD), required:

Components: <Namespace ID (IS)> ^ <Universal ID (ST)> ^ <Universal ID Type (ID)>

The IHE Laboratory Technical Framework requires that this field be populated with:

First component (required): Namespace ID. The name of the organizational entity responsible for the sending application.

Second component (optional): The URI (OID) of the organizational entity responsible for the sending application.

Third component (optional): The type of identification URI provided in the second component of this field. The codification of these three components is entirely site-defined. It may be detailed in the national extensions of this framework.

MSH-6 Receiving Facility (HD), required:

Components: <Namespace ID (IS)> ^ <Universal ID (ST)> ^ <Universal ID Type (ID)>

The IHE Laboratory Technical Framework requires that this field be populated with:

First component (required): Namespace ID. The name of the organizational entity responsible for the receiving application.

Second component (optional): The URI (e.g. OID) of the organizational entity responsible for the receiving application.

Third component (optional): The type of identification URI provided in the second component of this field. The codification of these three components is entirely site-defined. It may be detailed in the national extensions of this framework.

MSH-9 Message Type (MSG), required:

Components: <Message Code (ID)> ^ <Trigger Event (ID)> ^ <Message Structure (ID)>

Definition: This field contains the message type, trigger event, and the message structure ID for the message. All three components are required.

Its content is defined within each transaction-specific section of this document.

MSH-10 Message Control Id (ST), required:

Definition: This field contains a number or other identifier that uniquely identifies the message. Each message should be given a unique identifier by the sending system. The receiving system will echo this ID back to the sending system in the Message Acknowledgment segment (MSA). The combination of this identifier and the name of the sending application (MSH-3) should be unique across the Healthcare Enterprise.

MSH-12 Version ID (VID), required:

Components: <Version ID (ID)> ^ <Internationalisation Code (CE)> ^ <International Version ID (CE)>

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

The IHE Laboratory Technical framework requires the first component to be populated with the value "2.5" representing HL7 release 2.5.

MSH-15 Accept Acknowledgment Type (ID), not supported: IHE uses only the HL7 original acknowledgement mode.

MSH-16 Application Acknowledgment Type (ID), not supported for the same reason.

MSH-17 Country Code (ID), required if available.

Definition: This field contains the country of origin for the message. The values to be used are those of ISO 3166, with the 3-character (alphabetic form). Refer to HL7 Table 0399 - Country code

Examples of valid values:
JPN = Japan, USA = United States, GBR = United Kingdom, ITA = Italy, FRA = France, NLD = Netherlands.

MSH-18 Character Set (ID), conditional.

Definition: This field contains the character set for the entire message. Refer to HL7 table 0211 - Alternate character sets for valid values.

Examples of valid values:

ASCII: The printable 7-bit ASCII character set.

8859/1: The printable characters from the ISO 8859/1 Character set used by Western Europe. This character set can still be used, but 8859/15 should be used by preference. This character set is the forward-compatible version of 8859/1 and includes new characters such as the Euro currency symbol.

ISO IR87: Code for the Japanese Graphic Character set for information interchange (JIS X 0208-1990).

UNICODE UTF-8: UCS Transformation Format, 8-bit form.

Condition predicate: This field shall only be valued if the message uses a character set other than the 7-bit ASCII character set. Though the field is repeatable in HL7, IHE authorizes only one occurrence (i.e. one character set). The character set specified in this field is used for the encoding of all of the characters within the message.

MSH-19 Principal Language of Message (CE), required if available. Coded from ISO 639.

Examples: DE = German, EN = English, ES=Spanish, JA = Japanese, FR = French, NL = Dutch, IT = Italian

MSH-20 Alternate Character Set Handling Scheme (ID), not supported: Character set switching is not allowed in the IHE Laboratory Technical Framework.

MSH-21 Message Profile Identifier (EI), Required if available.

For IHE Laboratory Technical Framework, this field shall only be valued in the messages for which a Message Profile has been officially defined and identified. When multiple message profiles are listed in this field they should be (vendor specific, country specific) constraints of the IHE Laboratory Profile. Note that the overriding of IHE Laboratory Profile constraints is only allowed in national extensions to this framework.

3.2 MSA - Message Acknowledgement segment

HL7 v2.5: chapter 2 (2.15 Message control)

This segment contains information sent while acknowledging another message.

Table 3.2-1: MSA - Message Acknowledgement

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	2	ID	R	[1..1]	0008	00018	Acknowledgement code
2	20	ST	R	[1..1]		00010	Message Control Id
3	80	ST	X	[0..0]		00020	Text Message
5			X	[0..0]		00022	Delayed Acknowledgment Type
6	250	CE	X	[0..0]	0357	00023	Error Condition

MSA-1 Acknowledgment Code (ID), required.

The IHE Laboratory Technical Framework authorizes only one of the three values below, taken from HL7 *table 0008 - Acknowledgement code*:

Table 3.2-2: HL7 table 0008 - Acknowledgement code

Value	Description	Comment
AA	Original mode: Application Accept	The message has been accepted and integrated by the receiving application
AE	Original mode: Application Error	The sender should try again to send the message later
AR	Original mode: Application Reject	The message has been rejected by the receiving application

MSA-2 Message Control ID (ST), required.

Definition: This field contains the message control ID from the MSH-10 - Message Control ID of the incoming message for which the acknowledgement is sent.

MSA-3 Text Message (ST), not supported. See the ERR segment.

3.3 ERR - Error segment

HL7 v2.5 : chapter 2 (2.15 Message control)

This segment is used to add error comments to acknowledgment messages.

Table 3.3-1: ERR – Error segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	493	ELD	X	[0..0]		00024	Error Code and Location
3	705	CWE	R	[1..1]	0357	01813	HL7 Error Code
4	2	ID	R	[1..1]	0516	01814	Severity

Notes: ERR-1 is included in HL7 v2.5 for backward compatibility only. Within the context of the laboratory, this field shall not be used.

ERR-3 and ERR-4 are required by HL7 v2.5

3.4 NTE - Notes and Comment segment

HL7 v2.5 : chapter 2 (2.15 Message control)

This segment is used for sending notes and comments.

The IHE Laboratory Technical Framework limits the use of this segment to only one purpose: To comment the observations and the orders. Therefore, in the messages of this Integration Profile, NTE segments appear only below OBR or OBX segments.

Information that can be coded in OBX segments or OBR segments shall not be sent in a NTE segment.

Table 3.4-1: NTE - Notes and Comment segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	4	SI	R	[1..1]		00096	Set ID – NTE
2	8	ID	RE	[0..1]		00097	Source of Comment
3	65536	FT	RE	[0..1]		00098	Comment
4	250	CE	RE	[0..1]		01318	Comment Type

NTE-1 Set ID - NTE (SI), required.

NTE-2 Source of Comment (ID), required but may be empty.

IHE Laboratory Technical Framework populates this field with one of these values:

Table 3.4-2 : Source of Comment

Value	Meaning	Comment
L	Order Filler is the source of the comment	
P	Order Placer is the source of the comment	
A	Automation Manager is the source of the comment	
O	Other system is the source of the comment	

NTE-3 Comment (FT), required but may be empty: This field contains the text of the comment. This text may be formatted. In order to delete an existing comment, the field shall contain empty quotation marks: " " .

Comment text of identical type and source shall be included in the same occurrence of an NTE segment, and not be split over multiple segments.

NTE-4 Comment Type (CE), required if known.

The IHE Laboratory Technical Framework populates this field with one of these values:

Table 3.4-3 : Comment Type

Value	Meaning	Comment
I	Internal remark, that shall not be sent outside of the laboratory	Used between Automation Manager and Order Filler. Shall not be sent to the Order Result Tracker
C	Comment addressed to medical staff and physician,	Should be sent to the Order Result Tracker or the Order Placer, but should not be showed to the patient
P	Comment addressed to medical staff and physician, may be showed to the patient	Should be sent to the Order Result Tracker or the Order Placer, and may appear on the result report addressed to the patient.

3.5 PID - Patient Identification segment

HL7 v2.5 : chapter 3 (3.4.2)

The PID segment is used by all applications as the primary means of communicating patient identification information. This segment contains permanent patient identifying and demographic information that, for the most part, is not likely to change frequently.

Table 3.5-1 : PID - Patient Identification segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	4	SI	O	[1..1]		00104	Set ID - PID
2	20	CX	X	[0..1]		00105	Patient ID
3	250	CX	R	[1..*]		00106	Patient Identifier List
4	20	CX	X	[0..1]		00107	Alternate Patient ID - PID
5	250	XPN	R	[1..*]		00108	Patient Name
6	250	XPN	O	[0..1]		00109	Mother's Maiden Name
7	26	TS	RE	[0..1]		00110	Date/Time of Birth
8	1	IS	R	[1..1]	0001	00111	Administrative Sex
9	250	XPN	X	[0..1]		00112	Patient Alias
10	250	CE	RE	[0..1]	0005	00113	Race
11	250	XAD	RE	[0..*]		00114	Patient Address
12	4	IS	X	[0..1]	0289	00115	County Code
13	250	XTN	O	[0..*]		00116	Phone Number - Home
14	250	XTN	O	[0..*]		00117	Phone Number - Business
15	250	CE	O	[0..1]	0296	00118	Primary Language
16	250	CE	O	[0..1]	0002	00119	Marital Status
17	250	CE	O	[0..1]	0006	00120	Religion
18	250	CX	RE	[0..1]		00121	Patient Account Number
19	16	ST	X	[0..1]		00122	SSN Number - Patient
20	25	DLN	X	[0..1]		00123	Driver's License Number - Patient
21	250	CX	O	[0..*]		00124	Mother's Identifier
22	250	CE	O	[0..1]	0189	00125	Ethnic Group
23	250	ST	O	[0..1]		00126	Birth Place
24	1	ID	O	[0..1]	0136	00127	Multiple Birth Indicator
25	2	NM	O	[0..1]		00128	Birth Order
26	250	CE	O	[0..1]	0171	00129	Citizenship
27	250	CE	O	[0..1]	0172	00130	Veterans Military Status
28	250	CE	X	[0..0]	0212	00739	Nationality
29	26	TS	O	[0..1]		00740	Patient Death Date and Time
30	1	ID	O	[0..1]	0136	00741	Patient Death Indicator
31	1	ID	RE	[0..1]	0136	01535	Identity Unknown Indicator
32	20	IS	RE	[0..1]	0445	01536	Identity Reliability Code
35	250	CE	C	[0..1]	0446	01539	Species Code
36	250	CE	C	[0..1]	0447	01540	Breed Code

570 The specific usage of these fields, especially those fields with usage " O " (optional) in the table above, is explained in the national extensions.

PID-7: if the exact date of birth is not known, the second component of this field can be used to describe the degree of precision of the information entered in the first component.

PID-18: The use of the Patient Account Number may be related to the Visit Number (PV1-19). Generally, one of both fields will be filled. Additional requirements for these fields may be documented in Regional or National appendices to the IHE Laboratory Technical Framework.

PID-35, PID-36:

Condition predicate: shall be used if the test subject is a non-human living subject.

3.6 PV1 - Patient Visit segment

HL7 v2.5: chapter 3 (3.4.3)

The PV1 segment is used by Registration/Patient Administration applications to communicate information on an account or visit-specific basis.

Table 3.6-1: PV1 - Patient Visit segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
2	1	IS	R	[1..1]	0004	00132	Patient Class
3	80	PL	RE	[0..1]		00133	Assigned Patient Location
9	250	XCN	X	[0..0]	0010	00139	Consulting Doctor
19	250	CX	RE	[0..1]		00149	Visit Number
40	1	IS	X	[0..0]	0116	00170	Bed Status
51	1	IS	C	[0..1]	0326	01226	Visit Indicator
52	250	XCN	X	[0..0]	0010	01274	Other Healthcare Provider

The specific usage of these fields may be elaborated upon in the national extensions.

The use of the Visit Number (PV1-19) may be related to the Patient Account Number (PID-18). Generally, one of both fields will be filled. Additional requirements for these fields may be documented in Regional or National appendices to the IHE Laboratory Technical Framework.

Field PV1-51 shall be valued with value 'V' if the field PV1-19 is present. The field may be omitted otherwise.

The PV1 segment doesn't entirely cover the data model as defined in this framework. In some countries (especially in Europe), national extensions will define new segment to manage issues like 'functional units'.

The use of the PV1 segment shall be clarified in each national extension.

3.7 ORC Common Order Segment

HL7 v2.5: chapter 4 (4.5.1). The ORC and OBR segments contain a number of duplicate fields. The Laboratory Technical Framework is defined is such a way that fields in the OBR segment will be used in prevalence over their equivalents in ORC. If a field is listed as being optional in ORC, its equivalent in OBR may well be mandatory.

Table 3.7-1 : ORC Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	2	ID	R	[1..1]	0119	00215	Order Control
2	22	EI	C	[0..1]		00216	Placer Order Number
3	22	EI	C	[0..1]		00217	Filler Order Number
4	22	EI	RE	[0..1]		00218	Placer Group Number
5	2	ID	C	[0..1]	0038	00219	Order Status
7	200	TQ	X	[0..0]		00221	Quantity/Timing
8	200	EIP	X	[0..0]		00222	Parent
9	26	TS	R	[1..1]		00223	Date/Time of Transaction
10	250	XCN	RE	[0..*]		00224	Entered By
11	250	XCN	RE	[0..*]		00225	Verified By
17	250	CE	RE	[0..1]		00231	Entering Organization
20	250	CE	X	[0..0]	0339	01310	Advanced Beneficiary Notice Code
21	250	XON	RE	[0..1]		01311	Ordering Facility Name
25	250	CWE	X	[0..0]		01473	Order Status Modifier
26	60	CWE	X	[0..0]	0552	01641	Advanced Beneficiary Notice Override Reason
27	26	TS	C	[0..1]		01642	Filler's Expected Availability Date/Time

ORC-1 Order Control (ID), required. This field may be considered the "trigger event" identifier for orders. Many order control codes are defined in the *HL7 table 0119 – Order Control Codes*. The IHE Laboratory Technical Framework allows only the following subset:

Table 7.4.1.2.4-1: Supported Order Control Code

Value	Description of use
NW	"New Order". Event request in OML message sent by the Order Placer in transaction LAB-1 or in OML message sent by the Order Filler in transaction LAB-4.
OK	"Notification or request accepted". Event notification in OML message. Event acknowledgement in ORL message
UA	"Unable to accept order/service". Event notification in OML message. Event acknowledgement in ORL message sent by the Order Filler in transaction LAB-1 or in ORL message sent by the Automation Manager in transaction LAB-4.
SC	"Status changed". Event notification in OML and OUL messages
CA	"Cancel order/ service request". Event request in OML message sent by the Order Placer in LAB-1, or by the Order Filler in LAB-4.
CR	"Canceled as requested". Event acknowledgement in ORL message responding to OML (CA)
UC	"Unable to cancel". Event acknowledgement in ORL message responding to OML (CA)

Value	Description of use
OC	"Order service canceled". Event notification in OML message sent by the Order Filler in transactions LAB-1 and LAB-3.
SN	"Send order/service number". Event request in OML message sent by the Order Filler in transaction LAB-2
NA	"Number assigned". Event acknowledgement in ORL message sent by the Order Placer in LAB-2, responding to OML (SN)
RP	"Order/service replace request". Event request in OML message sent by the Order Placer in transaction LAB-1 or in OML message sent by the Order Filler in transaction LAB-4.
RQ	"Replaced as requested". Event acknowledgement in ORL message responding to OML (RQ)
UM	"Unable to replace". Event acknowledgement in ORL message responding to OML (RQ)
RU	"Replaced unsolicited". Event notification in OML message (LAB-1) and OUL message (LAB-3) sent by the Order Filler.
XO	"Change order/service request". Used by the Order Placer in LAB-1
XR	"Changed as requested". Used by the Order Filler in LAB-1 in response to XO
UX	"Unable to change" Used by the Order Filler in LAB-1 in response to XO

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ORC-2 Placer Order Number (EI), conditional.

Condition predicate: if the field is valued then its value shall match the value of the required field OBR-2. Please refer to section 2.3.6.1 for the details of the data type.

ORC-3 Filler Order Number (EI), conditional.

Condition predicate: if the field is valued then its value shall match the value of the required field OBR-3. Please refer to section 2.3.6.1 for the details of the data type.

ORC-4 Placer Group Number (EI), required if known to the sender.

The Placer Group Number represents an identification of a set of closely related orders, i.e. the whole list of batteries ordered by the placer to the laboratory for one subject. Please refer
620 to section 2.3.6.1 for the details of the data type.

ORC-5 Order Status (ID), conditional.

Condition predicate: This field shall be valued in all OML messages sent by the Order Filler. It represents the status of the order. This field shall not be valued in OML messages sent by the Order Placer.

The allowed values for this field within IHE Laboratory Technical Framework are a subset of *HL7 table 0038 - Order Status:*

Table 3.7-2 : HL7 table 0038 - Order Status: IHE subset for all transactions

Value	Description	Comment
A	Some, but not all, results available	
CA	Order was canceled	
CM	Order is completed	
IP	In process, unspecified	
SC	In process, scheduled	

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Note: For the conditions of use of these values, please read section 3.12 "Correlations of status between ORC, OBR and OBX".

ORC-9 Date/Time of Transaction (TS), required

HL7 Definition: This field contains the date and time of the event that initiated the current transaction as reflected in ORC-1 Order Control Code. This field is not equivalent to MSH-7 Date and Time of Message that reflects the date/time of the creation of the physical message.

In OML messages "Status changed" sent by the Order Filler, this field contains the date/time of the last status change of the order (ORC-5) or one of the ordered batteries (identified in the following OBR).

ORC-12 Ordering Provider (XCN), optional. If the field is valued then its value has to match the value of the required field OBR-16.

This field contains the person (physician) who prescribed this order. See the data model in volume 1.

ORC-14 Callback Phone Number (XTN), optional. If the field is valued then its value has to match the value of the required field OBR-17.

ORC-21 Ordering Facility Name (XON), required but may be empty.

This field contains the facility (care unit) placing this order. These three components shall be valued: 1st = Organization name. 7th = Identifier Type Code whith the value “FI”, which means “Falility ID” as stated by HL7 table n° 0203. 10th = Organization Identifier. Example: Urology^^^^^^FI^^^UR01

ORC-27 Fillers Expectable Availability Date/Time (TS), conditional.

This field contains the date/time when the laboratory results are expected to be available.

Condition predicate: This field may be valued only in OML messages sent by the Order Filler

3.8 TQ1 - Timing Quantity Segment

HL7 v2.5: chapter 4 (4.5.4)

Table 3.8-1: TQ1 - Timing Quantity Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
9	250	CWE	R	[1..1]	0485	01635	Priority
12	10	ID	C	[0..1]	0427	01638	Conjunction

This cycle of IHE Laboratory Technical Framework uses does not use TQ2 segment, and uses only one occurrence of TQ1 segment, with a single field required in it: TQ1-9 Priority (CWE). This field defines the priority of the order. The authorized values for this field are listed in HL7 table 0485 - Priority codes:

Table 3.8-2: HL7 table 0485 - Priority codes

Value	Description	Comment
S	Stat	With highest priority
A	ASAP	Fill after S orders
R	Routine	Default
P	Preop	
C	Callback	
T	Timing critical	A request implying that it is critical to come as close as possible to the requested time, e.g., for a trough anti-microbial level.
TS<integer>		Timing critical within <integer> seconds.
TM<integer>		Timing critical within <integer> minutes.
TH<integer>		Timing critical within <integer> hours.
TD<integer>		Timing critical within <integer> days.
TW<integer>		Timing critical within <integer> weeks.
TL<integer>		Timing critical within <integer> months.
PRN	As needed	

All the other fields of TQ1 segment are left optional in this release of the framework.

Transactions LAB-1, LAB-2 and LAB-3 restrict the usage to the first 6 values: S, A, R, P, C, T

TQ1-12 Conjunction (ID), conditional.

Condition predicate: this field shall only be used when the TQ1 segment occurs several times. In this Framework, TQ1 segment may occur only once. Therefore, this field shall never be filled.

3.9 SPM - Specimen Segment

HL7 v2.5: chapter 7 (7.4.3)

Table 3.9-1: SPM - Specimen Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
2	80	EIP	C	[0..1]		01755	Specimen ID
3	80	EIP	RE	[0..*]		01756	Specimen Parent IDs
4	250	CWE	RE	[1..1]	0487	01900	Specimen Type
8	250	CWE	C	[0..1]		01901	Specimen Source Site
9	250	CWE	C	[0..*]	0542	01760	Specimen Source Site Modifier
11	250	CWE	RE	[0..*]	0369	01762	Specimen Role
16	250	CWE	RE	[0..1]	0489	01903	Specimen Risk Code
17	26	DR	RE	[0..1]		01765	Specimen Collection Date/Time
18	26	TS	C	[0..1]		00248	Specimen Received Date/Time
20	1	ID	C	[0..1]	0136	01766	Specimen Availability
21	250	CWE	C	[0..*]	0490	01767	Specimen Reject Reason
26	4	NM	RE	[0..1]		01772	Number of Specimen Containers

SPM-2 Specimen ID (EIP), conditional.

This field contains a unique identifier for the specimen, enterprise-wide.

Condition predicate: This field shall be populated in OML messages of transaction LAB-1, in the context of the use case "Externally placed order with identified specimens" defined in volume 1. This field is required in OML messages of the LAB-2 transactions. It may also be used in transactions LAB-3. This field is required if known (RE) in transactions LAB-4 and LAB-5. Please refer to section 2.3.6.1 for the details of the data type.

SPM-3 Specimen Parent ID (EIP), required if available.

This field contains the identifier for the parent specimen, from which the specimen described by the segment instance has been extracted. Please refer to section 2.3.6.1 for the details of the data type.

This version of IHE Laboratory Technical Framework does not admit pooling of specimens; therefore the maximum cardinality for the parent specimen is 1. See the data model in Volume 1 of this document.

SPM-4 Specimen Type (CWE), required if available.

The authorized values for this field are those of HL7 table 0487 - Specimen type. See HL7 v2.5 chapter 7 (7.18.4). HL7 doesn't suggest values for table 0487. The following table, which is a subset of HL7 table 0070, provides some values as an example.

Value	Description	Comment
ABS	Abscess	
AMN	Amniotic fluid	
ASP	Aspirate	

Value	Description	Comment
BIFL	Bile fluid	
BLDA	Blood arterial	
BBL	Blood bag	
BLDC	Blood capillary	
BPU	Blood product unit	
BLDV	Blood venous	
BON	Bone	
BRO	Bronchial	
BRN	Burn	
CALC	Calculus (=Stone)	
CDM	Cardiac muscle	
CNL	Cannula	
CTP	Catheter tip	
CSF	Cerebral spinal fluid	
CVM	Cervical mucus	
CVX	Cervix	
COL	Colostrum	
BLDCO	Cord blood	
CNJT	Conjunctiva	
CUR	Curettage	
CYST	Cyst	
DIAF	Dialysis fluid	
DOSE	Dose med or substance	
DRN	Drain	
DUFL	Duodenal fluid	
EAR	Ear	
EARW	Ear wax (cerumen)	
ELT	Electrode	
ENDC	Endocardium	
ENDM	Endometrium	
EYE	Eye	
EXG	Exhaled gas (=breath)	
FLT	Filter	
FIST	Fistula	
FLU	Body fluid, unsp	
GAS	Gas	
GAST	Gastric fluid/contents	
GEN	Genital	
GENC	Genital cervix	
GENL	Genital lochia	

Value	Description	Comment
GENV	Genital vaginal	
HAR	Hair	
IHG	Inhaled Gas	
IT	Intubation tube	
ISLT	Isolate	
LAM	Lamella	
LN	Line	
LNA	Line arterial	
LNV	Line venous	
LIQ	Liquid NOS	
MAR	Marrow	
MEC	Meconium	
MBLD	Menstrual blood	
MLK	Milk	
MILK	Breast milk	
NAIL	Nail	
NOS	Nose (nasal passage)	
ORH	Other	
PAFL	Pancreatic fluid	
PRT	Peritoneal fluid /ascites	
PLC	Placenta	
PLAS	Plasma	
PLB	Plasma bag	
PLR	Pleural fluid (thoracentesis fld)	
PPP	Platelet poor plasma	
PRP	Platelet rich plasma	
PUS	Pus	
RT	Route of medicine	
SAL	Saliva	
SMN	Seminal fluid	
SER	Serum	
SKN	Skin	
SKM	Skeletal muscle	
SPRM	Spermatozoa	
SPT	Sputum	
SPTC	Sputum - coughed	
SPTT	Sputum - tracheal aspirate	
STL	Stool = Fecal	
SWT	Sweat	
SNV	Synovial fluid (Joint fluid)	

Value	Description	Comment
TEAR	Tears	
THRT	Throat	
TISS	Tissue	
TISG	Tissue gall bladder	
TLGI	Tissue large intestine	
TLNG	Tissue lung	
TISPL	Tissue placenta	
TSMI	Tissue small intestine	
TISU	Tissue ulcer	
TUB	Tube NOS	
ULC	Ulcer	
UMB	Umbilical blood	
UMED	Unknown medicine	
URTH	Urethra	
UR	Urine	
URC	Urine clean catch	
URT	Urine catheter	
URNS	Urine sediment	
USUB	Unknown substance	
VITF	Vitreous Fluid	
VOM	Vomitus	
BLD	Whole blood	
BDY	Whole body	
WAT	Water	
WICK	Wick	
WND	Wound	
WNDA	Wound abscess	
WNDE	Wound exudate	
WNDD	Wound drainage	

SPM-8 Specimen Source Site (CWE), conditional.

Condition predicate: This field should be populated by the placer in microbiology, when the specimen source site is known. Example: "EAR".

SPM-9 Specimen Source Site Modifier (CWE), conditional.

Condition predicate: This field should be populated by the placer in microbiology, when the specimen source site modifier is known. Example: "LEFT" when the specimen has been collected from the left ear.

SPM-11 Specimen Role (CWE), required if known by the sender.

The allowed values are in HL7 user defined table 0369.

User-defined Table 0369 - Specimen Role

Value	Description	Comment
B	Blind Sample	
C	Calibrator, used for initial setting of calibration	
E	Electronic QC, used with manufactured reference providing signals that simulate QC results	
F	Specimen used for testing proficiency of the organization performing the testing (Filler)	
G	Group (where a specimen consists of multiple individual elements that are not individually identified)	
L	Pool (aliquots of individual specimens combined to form a single specimen representing all of the components.)	
O	Specimen used for testing Operator Proficiency	
P	Patient	
Q	Control specimen	
R	Replicate	
V	Verifying Calibrator, used for periodic calibration checks	

SPM-16 Specimen Risk Code (CWE), required if available.

This field contains any known or suspected specimen hazards. The authorized values for this field are those of HL7 table 0489 - Risk Codes. See HL7 v2.5 chapter 7 (7.4.3.16).

Condition predicate: This field shall be populated if known in OML messages sent by the Order Placer, within transaction LAB-1, and OML messages sent by the Order Filler within transactions LAB-2 and LAB-4. The allowed values are given by HL7 user-defined table 0489:

User-defined Table 0489 – Risk Codes

Code	Description	Comment/Usage Note/Definition
BIO	Biological	The dangers associated with normal biological materials. I.e. potential risk of unknown infections. Routine biological materials from living subjects.
COR	Corrosive	Material is corrosive and may cause severe injury to skin, mucous membranes and eyes. Avoid any unprotected contact.
ESC	Escape Risk	The entity is at risk for escaping from containment or control.
AGG	Aggressive	A danger that can be associated with certain living subjects, including humans.
IFL	MaterialDangerInflammable	Material is highly inflammable and in certain mixtures (with air) may lead to explosions. Keep away from fire, sparks and excessive heat.
EXP	Explosive	Material is an explosive mixture. Keep away from fire, sparks, and heat.
INF	MaterialDangerInfectious	Material known to be infectious with human pathogenic microorganisms. Those who handle this material must take precautions for their protection.
BHZ	Biohazard	Material contains microorganisms that are an environmental hazard. Must be handled with special care.
INJ	Injury Hazard	Material is solid and sharp (e.g., cannulas.) Dispose in hard container.
POI	Poison	Material is poisonous to humans and/or animals. Special care must be taken to avoid incorporation, even of small amounts.
RAD	Radioactive	Material is a source for ionizing radiation and must be handled with special care to avoid injury of those who handle it and to avoid environmental hazards.

SPM-17 Specimen Collection Date/Time (DR), required if available.

Definition: The date and time when the specimen was acquired from the source. The use of the Date Range data type allows for description of specimens collected over a period of time, for example, 24-hour urine collection. For specimens collected at a point in time, only the first component (start date/time) will be populated

SPM-18 Specimen Received Date/Time (TS), conditional.

The time that the specimen is received at the laboratory.

Condition predicate: This field shall be populated in OML messages sent by the Order Filler, within transactions LAB-1 (all use cases), LAB-2 and LAB-3, if the specimen has been received by the laboratory. In other words this field is RE for the order filler actor in both transactions LAB-1, LAB-2 and LAB-3.

SPM-20 Specimen Availability (ID), conditional.

This describes whether the specimen, as it exists, is currently available to use in an analysis. The two authorized values are "Y" (yes) or "N" (no).

Condition predicate: This field shall be populated in OML messages sent by the Order Filler, within transactions LAB-1 (all use cases) and LAB-2. The value 'N' indicates either that the laboratory hasn't received the specimen yet, or that it has rejected the received specimen. In other words this field is RE for the order filler actor. The value of this field can be implicitly derived from ORC-5 (e.g. ORC-5 = 'IP' implicitly means that the specimen has arrived, otherwise the test could not be in progress).

This field is pointless in messages sent by the Order Placer.

SPM-21 Specimen Reject Reason (CWE), conditional.

This describes one or more reasons the specimen is rejected for the ordered batteries

Condition predicate: This field shall be populated in OML messages sent by the Order Filler in transaction LAB-1, whenever the laboratory rejects a specimen.

Refer to HL7 Table 0490 - Specimen Reject Reason for valid values:

Table 3.9-2 : HL7 Table 0490 - Specimen Reject Reason

Value	Description	Comment
EX	Expired	
QS	Quantity not sufficient	
RB	broken container	
RC	Clotting	
RD	missing collection date	
R	missing patient ID number	
RE	missing patient name	
RH	Hemolysis	
RI	Identification problem	
RL	Improper labeling	
RM	labeling	
RN	contamination	
RP	missing phlebotomist ID	
RR	improper storage	
RS	name misspelling	

SPM-26 Number of Specimen Containers (NM), required if available.

HL7 Definition: This field identifies the number of containers for a given specimen. For sample receipt verification purposes; may be different from the total number of specimens that accompany the order.

3.10 SAC Container Detail Segment

HL7 v2.5: chapter 13

The IHE Laboratory Technical Framework defines the usage of 2 SAC fields; it allows all other fields to be optionally used.

Table 3.10-1 : SAC Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
3	80	EI	R	[1..1]		01331	Container Identifier
4	80	EI	C	[0..1]		01332	Primary (parent) Container Identifier
6	300	SPS	X	[0..0]		00249	Specimen Source

Condition for the use of the SAC segment in OML^O21, ORL^O22, OML^O33, ORL^O34: The SAC segment should be used in those message structures within transactions LAB-1, LAB-2, LAB-4 and LAB-5, only if the number of containers differs from the number of specimens (e.g. a specimen is split between several containers) or if the container identifier differs from the specimen identifier. Otherwise, when there is one container for one sample, and one identifier for both specimen and container, then, the SPM segment is sufficient: The SPM-2 Specimen ID provides the specimen/container identifier. The SPM-3 Specimen Parent Ids provides the identification of the primary specimen in case of an aliquot.

SAC-3 – Container Identifier (EI), required.

SAC-3 field identifies the container. This field is the container's unique identifier assigned by the corresponding equipment. A container may contain the primary (original) specimen or an aliquot (secondary sample) of that specimen. For primary sample this field contains Primary Container ID; for bar-coded aliquot samples this field contains Aliquot Container ID.

SAC-4 – Primary (parent) Container Identifier (EI), conditional.

Condition predicate: This field is used only in transactions LAB-4 and LAB-5 when dealing with an aliquoted specimen. In that case, SAC-3 and SAC-4 are used simultaneously as described below:

If SAC-4 field is filled in, it identifies the primary container from which this specimen came. For primary samples this field is empty; for aliquot samples this field should contain the identifier of primary container.

3.11 OBX - Observation/Result Segment

HL7 v2.5: chapter 7 (7.4.2)

Table 3.11-1 : OBX Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	4	SI	R	[1..1]		00569	Set ID – OBX
2	2	ID	C	[0..1]	0125	00570	Value Type
3	250	CE	R	[1..1]		00571	Observation Identifier
4	20	ST	C	[0..1]		00572	Observation Sub-ID
5	99999	Varies	C	[0..1]		00573	Observation Value
6	250	CE	C	[0..1]		00574	Units
7	60	ST	RE	[0..1]		00575	References Range
8	5	IS	RE	[0..1]	0078	00576	Abnormal Flags
9	5	NM	X	[0..0]		00577	Probability
10	2	ID	X	[0..0]	0080	00578	Nature of Abnormal Test
11	1	ID	R	[1..1]	0085	00579	Observation Result Status
12	26	TS	X	[0..0]		00580	Effective Date of Reference Range
13	20	ST	C	[0..1]		00581	User Defined Access Checks
14	26	TS	RE	[0..1]		00582	Date/Time of the Observation
15	250	CE	RE	[0..1]		00583	Producer's ID
16	250	XCN	RE	[0..1]		00584	Responsible Observer
17	250	CE	C	[0..1]		00936	Observation Method
18	22	EI	X	[0..0]		01479	Equipment Instance Identifier
19	26	TS	X	[0..0]		01480	Date/Time of the Analysis

OBX-1 Set ID - OBX (SI), required.

790 This field contains the sequence number of the OBX.

OBX-2 Value Type (ID), conditional.

Condition predicate: This field shall be valued if OBX-5 (Observation Value) is populated. The Value Type field should be filled according to HL7 Version 2.5 standard (table 0125). For example, if the result is ">300" the Value Type "SN" (Structured Numeric) SHALL be used instead of the "ST" (String) value type that was used in previous versions of HL7. See the details and the examples in the HL7 V2.5 (7.4.2). For an observation that consists of a time measurement (e.g. bleeding time) the TM Value Type is preferred to NM but this is not made mandatory.

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OBX-3 Observation Identifier (CE), required

The usage of LOINC(r) test codes for the identification of tests is strongly recommended. Details of this free vocabulary can be found at http://www.loinc.org .

The first and third sub-fields "Identifier", and "Name of Coding System" are required in all transactions. The value of the "Name of Coding System" in the case of LOINC is "LN".

In transaction LAB-3 the second sub-field “Text” is mandatory, which allows the Order Result Tracker to manage the results without the help of Test Master File.

The last three sub-fields are optional in all transactions.

OBX-4 Observation Sub-ID (ST), conditional.

Condition predicate: This field shall be used to distinguish between multiple OBX segments with the same observation ID organized under one OBR.

See HL7 V2.5 (7.4.2) for details and examples.

OBX-5 Observation Value (varies), conditional.

Condition predicate: This field is required unless the Observation Result Status field (OBX-11) is valued either with "D", or "I" or "X". The Observation Value field shall be valued accordingly to the definition made in Chapter 7 of HL7 2.5 version.

OBX-6 Units (CE), conditional.

This field in required if the Value Type field (OBX-2) is valued either with "NM", or "SN". If valued, this field should identify SI or SI-derived units only.

OBX-7 References Range (ST), required if available.

This field should be valued as described in HL7 V2.5 for all observations for which it is relevant. The References range that figures in this field is supposed to be related to age and sex of the patient or to other parameters such as number of weeks of pregnancy when applicable, which makes the OBX-10 field (nature of abnormal test) unnecessary.

OBX-8 Abnormal Flags (IS), required if available.

This field is required when applicable. This field is not repeatable in the IHE Laboratory Framework. Among the possible values listed for this field in HL7 table 0078, the actors of IHE Laboratory Technical Framework should support the following values:

Table 3.11-2 : HL7 table 0078

Value	Description	Comment
L	Below low normal	
H	Above high normal	
LL	Below lower panic limits	
HH	Above upper panic limits	
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	
S	Susceptible. Indicates for microbiology susceptibilities only.	
R	Resistant. Indicates for microbiology susceptibilities only.	
I	Intermediate. Indicates for microbiology susceptibilities only.	

As described in the above table, the S, R, or I values shall be used to indicate the interpreted result of susceptibilities in microbiology, in case the value field (OBX-5) contains a numeric value that represents the MIC (Minimum Inhibitive Concentration). In case the order filler only reports the interpreted result for susceptibilities, the S, R, or I value could be filled in the value field (OBX-5) with a Value Type (OBX-2) set to "ST".

840 **OBX-11 Observation Result Status (ID)**, required.

This field should be filled according to HL7 Table 0085 described in Chapter 7 of HL7. In this version of the Laboratory Technical Version, the possible values for this field are a subset of this table:

Table 3.11-3 : HL7 Table 0085

Value	Description	Comment
O	Order detail description only (no result)	This can be used in LAB-3 to provide the Order Result Tracker with the list of individual tests that will be performed
I	Specimen in lab; results pending	This can be used in LAB-3 to provide the Order Result Tracker with the list of individual tests that are being performed
D	Deletes the OBX record	This status should be used when the sender (Order Filler in LAB-3 and LAB-4, Automation Manager in LAB-5) wants to cancel a false result transmitted in a former message, in the situation where the right result is still pending. The result should NEVER be shown to clinical users.
R	Results entered – not verified	In LAB-5: not technically validated. In LAB-3: not clinically validated.
P	Preliminary results	In LAB-5: result technically validated but can still change In LAB-3: result clinically validated but can still change
F	Final results; Can only be changed with a corrected result.	Can only be changed with a corrected result. In LAB-1 and LAB-3, a final result is clinically validated. In LAB-5, a final result is technically validated.
C	Record coming over is a correction and thus replaces a final result	This status may be used only after an 'F' or a 'C' status.
X	Results cannot be obtained for this observation	Tests that have this status have to be shown to the user.

Note: For the conditions of use of these values, please read section 3.12 "Correlations of status between ORC, OBR and OBX".

850 **OBX-12 Effective Date of Reference Range (TS)**

Since the Reference range given by the order filler is the one that applies to the Observation result taking into account other parameters such as patient age or sex; there is no need to manage the present field. The Order Result Tracker should store the observation result and its associated reference range. In case the Order Result Tracker offers the capability to compare results of the same observation over different requests, it should then associate each result with its associated reference range.

OBX-13 User Defined Access Checks (ST), conditional.

Condition predicate: In transaction LAB-3, the Order Filler should value this field with a "P" when it wants to inform the Order Result Tracker of restricted access on some results to privileged users.

OBX-14 Date/Time of the Observation (TS), required if available.

This field should be valued when the OBX-5 field (Value field) is also valued. In very exceptional case this information may be unknown by the Order Filler (case the test is transmitted in a reference lab and observation date and time is not returned together with the result), this field can be null and the Order Result Tracker should not generate an error.

OBX-15 Producer's ID (CE), required if available.

This field is required in case the observation was not produced by the sending organization.

OBX-16 Responsible Observer (XCN), required if available.

This field is required when the observation result status (OBX-11) is valued with "D" or "R" or "P" or "F" or "C" or "X" and the Producer's ID field is not valued. It should contain the identity of the observer that causes the change of the observation result status. Only the first component (ID number) of this field is necessary, provided that it is possible to retrieve the full identity of responsible person in the Order Filler system with only this ID number.

OBX-17 Observation Method (CE), conditional.

Condition predicate: This field is required when the value of the result may be dependant of the Observation Method and the Observation Identifier does not permit to identify the Method. With some Observation Identifiers such as LOINC(r) Codes, the identifier also identifies the Method, in which case this field does not need to be valued.

OBX-18 Equipment Instance Identifier (EI), not supported.

Although this information should be available at the Order Filler level, this field should not be used in this first version of the Laboratory Technical Framework.

OBX-19 Date/Time of the Analysis (TS), not supported.

Since the OBX-18 field shall not be used this OBX-19 field is meaningless.

3.12 Correlations of status between ORC, OBR, OBX

3.12.1 Semantics of the main status code associations

In HL7 version 2.5 a change in the status of an observation is identified by a combination of the Trigger Event field contained in segment MSH, the ORC-5 (Filler Order status) field, the OBR-25 (Order Result Status) field and the OBX.11 (Observation Result Status) field. OBX-11 contains the status of an individual test, OBR-25 the status of the entire request.

Summary of the 3 relevant reference tables:

Order Table 0038 (ORC-5)	Request Table 0123 (OBR-25)	Result Table 0085 (OBX-11)	Description (combined from 3 tables)
	O	O	Order received; specimen not yet received. Order detail description only (OBX contains no result). This value should only be used in ORL event acknowledgment messages. It should not be used in OML messages.
SC	S		No results available; procedure scheduled, but not done. The specimen may not have arrived at the laboratory. No OBX is present
IP	I	I	In process; The specimen is available in the laboratory; results are pending; the procedure is incomplete
		D	Deletes the OBX record
A	R	R	(Some) results entered -- not yet verified
A	P	P	(Some) preliminary verified results: (technically validated in LAB-5, clinically validated in LAB-3). The final results are not yet obtained
CM	F	F	Final results; results stored and verified : (technically validated in LAB-5, clinically validated in LAB-3). Can only be changed with a corrected result.
(CM)	C	C	Record coming over is a correction and thus replaces a final result
CA	X	X	(OBX) Results cannot be obtained for this observation. (ORC/OBR) No results available; Order canceled.

Notes:

900 The status codes used in ORC-5 are less ‘atomic’ than those used in OBR-25/OBX-11. If there is no direct ‘semantic match’ the ORC-5 column lists the closest equivalent between braces.

The table shown above contains a description of the semantics of the code values used by these fields. Please note that this table does not identify all possible relationships of the various status fields. The relationship between the various status fields are described below.

3.12.2 Status transition diagrams

3.12.2.1 ORC-5: Order status

The status fields of an order and the associated result express the status of the order and result as they are processed and finalized. The transition of the coded values used in the status fields is shown below:

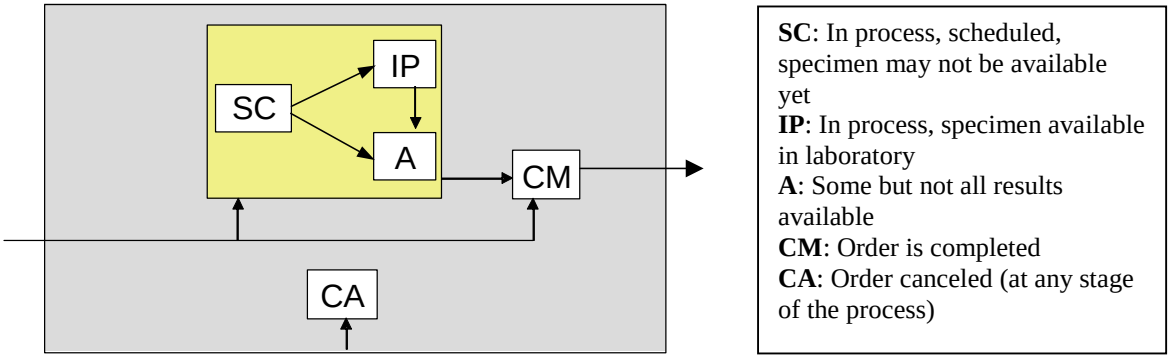


Figure 3.12.2.1-1: The ORC-5 status transition diagram

The status diagram in figure 3.12.2.1-1 above shows that, during normal processing, the initial status code in ORC-5 will be SC, IP, A or CM. If the status code equals SC, the next status code could be IP, A, CM or SC. If the status code equals IP, the next status code could be A, CM or IP. The special status codes CA (order was canceled) may occur at any stage of processing.

3.12.2.2 OBR-25: Order Result status

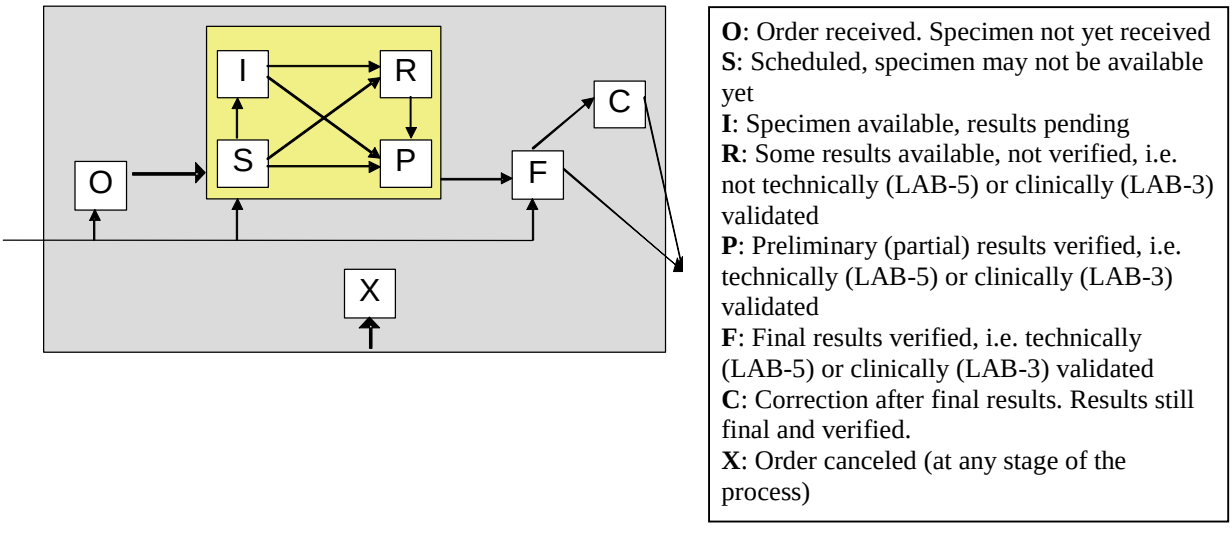
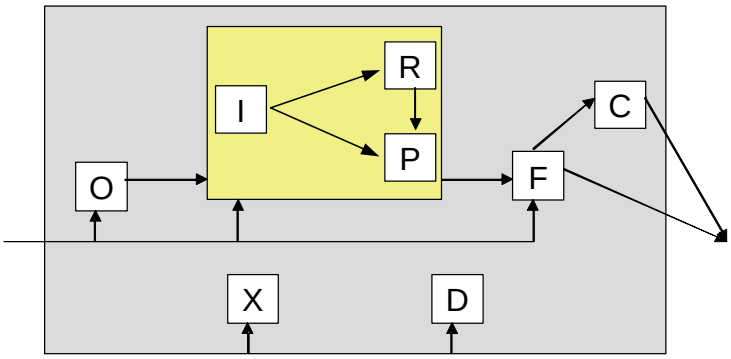


Figure 3.12.2.2-1: The OBR-25 status transition diagram

The status diagram in figure 3.12.2.2-1 above shows that, during normal processing, the initial status code in OBR-25 will be O, F, or one of the four codes shown in the center block. If the status code equals S, the next status code could be either I, R, P, F or S. If the status code equals P, the next status code could be either F or P. If the status code equals F, the next

status could be either F or C. The special status code X (order canceled) may occur at any stage of processing.

3.12.2.3 OBX-11: Obsevation Result Status



O: Order detail description only. No result
I: Specimen in lab, results pending
R: Result entered, not verified, i.e. not technically (LAB-5) or clinically (LAB-3) validated
P: Preliminary (partial) result verified, i.e. technically (LAB-5) or clinically (LAB-3) validated
F: Final result verified, i.e. technically (LAB-5) or clinically (LAB-3) validated
C: Correction after final result. Result still final and verified.
X: Result cannot be obtained for this observation
D: Deletes the OBX record

940 **Figure 3.12.2.3-1: The OBX-11 status transition diagram**

The status diagram in figure 3.12.2.3-1 above shows that, during normal processing, the initial status code in OBX-11 will be O, F, or one of the three codes shown in the center block. If the status code equals I, the next status code could be either I, R, P or F. If the status code equals P, the next status code could be either F or P.

The special status codes X (Result cannot be obtained for this observation) and D may occur at any stage of processing.

3.12.3 Relationship between the 3 status fields

The relationship between the 3 status fields is stated by the following rules:

950 1. The status as contained in the OBR-25 field cannot be “higher/more finalized” than the “lowest” status of any of the related individual tests (as contained in OBX-11). For example: OBR-25 can only be ‘F’ (Final) when all related OBX-11 fields contain ‘F’.
2. The status of the order as defined by the Order Fulfiller cannot be “higher/more finalized” than the status of the related request (as contained in OBR-25). For example: ORC-5 can only be ‘CM’ (Complete) when the related OBR-25 field contains ‘F’ (Final) or ‘C’ (Corrected).
3. For the purposes of determining which status is “higher/more finalized”, any OBX-11 status code value equal to X or D, and any OBR-25 status code value equal to X should be compared as if the value was F.

960

4 Transaction LAB-1 : Placer Order Management

4.1 Scope

Transaction LAB-1 is used by all of the three general use cases described in Volume 1.

This transaction is used by the Order Placer to place a new order to the Order Filler. An order is prescribed by a physician and/or ordered by a care unit, and is performed by a clinical laboratory. The order contains a list of batteries or test to be fulfilled, using biological specimens collected from the subject. A battery contains one or more tests, each of which may produce one or more observations.

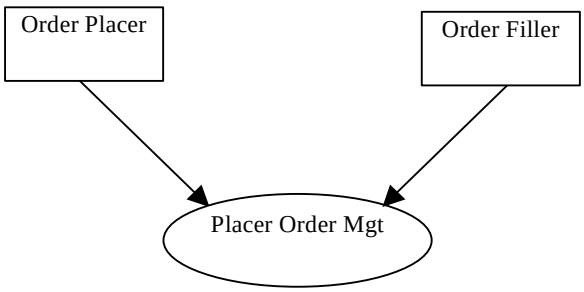
In some organizations the care unit provides the specimens and identifies them. In others, the laboratory collects and identifies them. In both cases, the laboratory is responsible for obtaining and managing valid specimens for the ordered batteries, in conformity with good laboratory practices. It is able to refuse the execution of the order or a part of it, if a specimen is non conforming, or missing.

Both Order Placer and Order Filler may update or cancel a former order. Update consists in replacing or removing batteries from the original list.

Adding new batteries by the Order Filler is out of scope of LAB-1: This task is achieved by transaction LAB-2.

The main goal of the Placer Order Management Transaction is to allow consistent management of the content and status of the order between the Order Placer and Order Filler actors.

4.2 Use Case Roles



Actor :Order Placer

Roles : Places orders. Updates orders. Cancels orders. Nullifies orders. Receives acceptance or rejection from the Order Filler. Receives order related changes from the Order Filler.

Actor :Order Filler

Roles : Receives orders. Checks the specimens required, and notifies the Order Placer of acceptance or refusal. Receives order related changes from the Order Placer. Notifies content updates (removed batteries/tests) to the Order Placer. Notifies the progression (scheduled, started, cancelled, completed) to the Order Placer.

4.3 Referenced standards

HL7 version 2.5:

- Chapter 2: "Control" --> generic segments and data types
- Chapter 3: "ADT" --> PID and PV1 segments
- Chapter 4: "Order Entry" --> OML and ORL messages
- Chapter 7: "Observation Reporting" --> SPM segment
- Chapter 13: "Clinical Laboratory Automation" --> SAC segment

4.4 Interaction diagrams

Trigger events: In all interactions below, the initiator chooses the best OML message structure appropriate to its orders. The responder SHALL respond with the related ORL message structure:

OML^O21 → ORL^O22
OML^O33 → ORL^O34
OML^O35 → ORL^O36

An OML message shall be responded to with exactly 1 ORL message.

Please note that the filler order number is required in the ORL messages. ORL messages SHALL be created by the Order Filler application, and not by a message broker or a communication system. The message broker (an intermediary between the Order Placer and the Order Filler) has no knowledge of the tests being requested and can't accept/reject these test on behalf of the Order Filler.

4.4.1 Normal process of a placer order

The figure below shows the flow of messages in the normal process of a placer order, from placing of the order by the Order Placer, to the "order completed" event notified by the Order Filler.

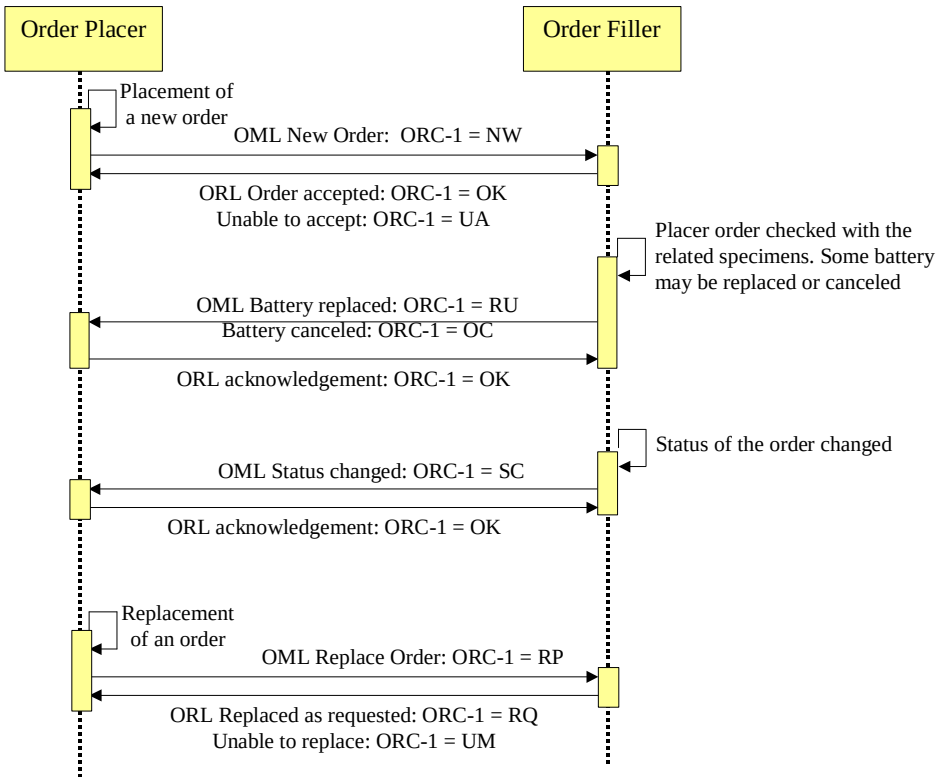


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Figure 4.4-1: Normal process of a placer order

Note: the laboratory may accept an order, with some batteries waiting for a new specimen.

4.4.2 Cancellation of an order by the Order Placer

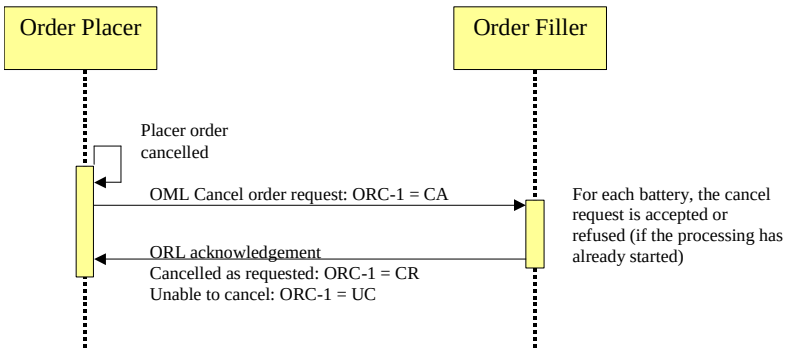


Figure 4.4-2: Cancellation of an order by the Order Placer

The Order Filler accepts the cancellation only if the processing has not started yet, particularly if no work order has been sent to the Automation Manager (through transaction LAB-4).

4.4.3 Cancellation of an order initiated by the Order Filler

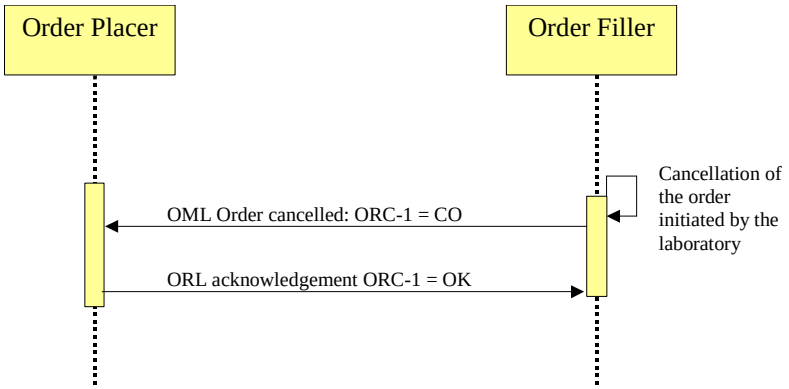


Figure 4.4-3: Cancellation by Order Filler

4.5 Messages static definitions

4.5.1 Available HL7 2.5 structures for OML message

HL7 v2.5 chapter 4, offers three different message structures for the OML message type :

- OML^O21^OML_O21: **laboratory order message.** This is a battery-centric structure: It contains a list of ordered batteries, a list of specimens underneath each battery, and a list of containers underneath each specimen. This structure implies duplication of specimen/container information whenever two batteries use the same specimen. It is more appropriate for ordering batteries that need several specimens (e.g. creatinine clearance, glucose tolerance test).
- OML^O33^OML_O33: **Laboratory order for multiple orders related to a single specimen**. This is a specimen-centric structure providing for each specimen a list of containers and a list of batteries (ORC/OBR segment groups) using this specimen. The batteries are not related to the containers.
- OML^O35^OML_O35: **Laboratory order for multiple orders related to a single container of a specimen.** This message structure provides for each specimen a list of containers, and for each container the list of batteries that are to be performed on that container. This structure is more appropriate when the ordered batteries are sorted by container.

4.5.2 Restrictions on OML message for transaction LAB-1

This cycle of Laboratory Technical Framework supports the three message structures defined above, and makes the following restrictions for transaction LAB-1:

- LAB-1 carries all clinical observations provided by the Care Unit, such as allergy, therapy, diagnosis, temperature, urine volume, blood pressure, within observation segments (OBX) that accompany the order. This choice has been made to simplify the building and parsing of the messages. All these specific patient observations are sent in the OML message, in OBX segments.
- LAB-1 restrains timing/quantity to one execution per order. This choice has also been made by "HL7 UK". The main reason for this choice is:

  The only operation that would have needed the iteration features provided by the segment TQ1 is the specimen collection. In this Laboratory Integration Profile this operation is not triggered by any message: It is an internal operation performed within the Order Placer actor or the Order Filler actor, depending on the organization. All orders sent to laboratories require one single execution, even the studies based on a temporal series of specimens. For example a serum glucose tolerance study is an atomic order to be performed once, taking into account all the specimens to be tested.

4.5.3 OML^O21 static definition

Table 4.5-1: OML^O21 static definition for transaction LAB-1

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message Header	R	[1..1]	2
[	--- PATIENT begin	O	[0..1]	
PID	Patient Identification	R	[1..1]	3
[PV1]	Patient Visit	RE	[0..1]	3
]	--- PATIENT end			
{	--- ORDER begin	R	[1..*]	
ORC	Common Order (for one battery)	R	[1..1]	4
[{TQ1}]	Timing Quantity	RE	[0..1]	4
[	--- OBSERVATION REQUEST begin	R	[1..1]	
OBR	Observation Request	R	[1..1]	4
{[NTE]}	Notes and Comments	O	[0..*]	2
[{	--- OBSERVATION begin	O	[0..*]	
OBX	Observation Result	R	[1..1]	7
[{NTE}]	Comment of the result	C	[0..*]	2
}]	--- OBSERVATION end			
[{	--- SPECIMEN begin	O	[0..*]	
SPM	Specimen	R	[1..1]	7
[{SAC}]	Container	C	[2..*]	13
}]	--- SPECIMEN end			
[{	--- PRIOR_RESULT begin	O	[0..*]	
PV1	Patient Visit – previous result	RE	[0..1]	3
{	--- ORDER_PRIOR begin	R	[1..*]	
[ORC]	Common Order - previous result	O	[0..1]	4
OBR	Order Detail - previous result	R	[1..1]	4
{[NTE]}	Notes and Comments - previous result	O	[0..*]	2
{	--- OBSERVATION_PRIOR begin	R	[1..*]	
OBX	Observation/Result - previous result	R	[1..1]	7
{[NTE]}	Notes and Comments - previous result	O	[0..*]	2
}	--- OBSERVATION_PRIOR end			
}	--- ORDER_PRIOR end			
]}	--- PRIOR_RESULT end			
]	--- OBSERVATION REQUEST end			
}	--- ORDER end			

Field MSH-9 - Message Type (MSG) shall have its three components respectively valued to "OML", "O21" and "OML_O21".

The triplet (ORC, TQ1, OBR) represents the order (i.e. an ordered battery/test). This triplet is repeated as many times as the number of batteries contained in the order group.

The OBSERVATION repeatable segment group carries the observations provided by the orderer (patient temperature, blood pressure, weight, …), with eventual comments (NTE).

The OBSERVATION PRIOR provides the prior results obtained for the same patient. Segment PID is not provided in this segment group because it is the same patient, and the laboratory is not concerned by the fact that this patient might have had a different identification when the prior results were produced.

Condition predicate for the SAC segment: See the common definition of the SAC segment in section 3.10.

Condition predicate for the NTE segment below OBX (Comment of the result): Information that can be coded in OBX segments or OBR segments shall not be sent in a NTE segment.

4.5.4 ORL^O22 static definition

Table 4.5-2 : ORL^O22 Message

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
MSA	Message Acknowledgement	R	[1..1]	2
[{ERR}]	Error	C	[0..*]	2
[PID]	Patient Identification	O	[0..1]	3
{	--- ORDER begin	R	[1..*]	
ORC	Common Order	R	[1..*]	4
[{TQ1}]	Timing/Quantity	RE	[0..1]	4
[	--- OBSERVATION REQUEST begin	R	[1..1]	
OBR	Observation Request	R	[1..1]	4
[{	--- SPECIMEN begin	O	[0..1]	
SPM	Specimen	R	[1..1]	7
[{SAC}]	Specimen Container Details	O	[0..*]	7
}]	--- SPECIMEN end			
]	--- OBSERVATION REQUEST end			
}	--- ORDER end			

MSH-9 - Message Type (MSG) shall have its three components respectively valued to "ORL", "O22" and "ORL_O22".

The ERR segment shall be used in case of negative acknowledgement (when MSA-1 = AE or AR).

4.5.5 OML^O33 static definition

Table 4.5-3: OML^O33

Segment	Meaning	Usage	Card.	HL7
MSH	Message Header	R	[1..1]	2
[	--- PATIENT begin	O	[0..1]	
PID	Patient Identification	R	[1..1]	3
[PV1]	Patient Visit	RE	[0..1]	3
]	--- PATIENT end			
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen	R	[1..*]	7
[{SAC}]	Specimen Container	C	[2..*]	13
{	--- ORDER begin	R	[1..*]	
ORC	Common Order (for one battery)	R	[1..*]	4
[{TQ1}]	Timing Quantity	RE	[0..1]	4
[	--- OBSERVATION REQUEST begin	R	[1..1]	
OBR	Observation Request	R	[1..1]	4
[{	--- OBSERVATION begin	O	[0..*]	
OBX	Observation Result	R	[1..1]	7
[{NTE}]	Notes and comments for result	C	[0..1]	
}]	--- OBSERVATION end			
{	--- PRIOR RESULT begin	O	[0..*]	
PV1	Patient Visit – previous result	RE	[0..1]	3
{	--- ORDER PRIOR begin	R	[1*]	
[ORC]	Common order – previous result	O	[0..1]	4
OBR	Order detail – previous result	R	[1..1]	4
{	--- OBSERVATION PRIOR begin	R	[1..*]	
OBX	Observation/Result – previous result	R	[1..1]	
[{NTE}]	Comment of the result	C	[0..*]	2
}	--- OBSERVATION PRIOR end			
}	--- ORDER PRIOR end			
}	--- PRIOR RESULT end			
]	--- OBSERVATION REQUEST end			
}	--- ORDER end			
}	--- SPECIMEN end			

1100 MSH-9 - Message Type (MSG) shall have its three components respectively valued to "OML", "O33", and "OML_O33".

The conditions on the OBSERVATION segment group are the same as for OML^O21.

The condition and cardinalities on the SAC segment are the same as for OML^O21.

4.5.6 ORL^O34 static definition

Table 4.5-4: ORL^O34

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
MSA	Message Acknowledgement	R	[1..1]	2
[{ERR}]	Error	O	[0..*]	2
[PID]	Patient Identification	O	[0..1]	3
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen	R	[1..1]	7
[{SAC}]	Specimen Container	O	[0..*]	13
[{	--- ORDER begin	O	[0..*]	
ORC	Common Order	R	[1..1]	4
[{TQ1}]	Timing/Quantity	RE	[0..1]	4
[OBR]	Observation Request	R	[1..1]	4
}]	--- ORDER end			
}	--- SPECIMEN end			

MSH-9 - Message Type (MSG) shall have its three components respectively valued to “ORL”, “O34” and “ORL_O34”.

4.5.7 OML^O35 static definition

Table 4.5-5 : OML^O35 static definition for transaction LAB-1

Segment	Meaning	Usage	Card	HL7
MSH	Message Header	R	[1..1]	2
[	--- PATIENT begin	O	[0..1]	
PID	Patient Identification	R	[1..1]	3
[PV1]	Patient Visit	RE	[0..1]	3
]	--- PATIENT end			
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen	R	[1..1]	7
{	--- CONTAINER begin	R	[1..*]	
SAC	Container detail	R	[1..1]	13
{	--- ORDER begin	R	[1..*]	
ORC	Common Order (for one battery)	R	[1..1]	4
[{TQ1}]	Timing Quantity	RE	[0..1]	4
[	--- OBSERVATION REQUEST begin	R	[1..1]	
OBR	Observation Request	R	[1..1]	4
[{	--- OBSERVATION begin	O	[0..*]	
OBX	Observation Result	R	[1..*]	7
[{NTE}]	Comment of the result	C	[0..*]	2
}]	--- OBSERVATION end			
[{	--- PRIOR_RESULT begin	O	[0..*]	
PV1	Patient Visit – previous result	RE	[0..1]	3
{	--- ORDER_PRIOR begin	R	[1..*]	
[ORC]	Common Order - previous result	R	[1..1]	4
OBR	Order Detail - previous result	R	[1..1]	4
{[NTE]}	Notes and Comments - previous result	O	[0..*]	2
{	--- OBSERVATION_PRIOR begin	R	[1..*]	
OBX	Observation/Result - previous result	R	[1..1]	7
{[NTE]}	Notes and Comments - previous result	O	[0..*]	2
}	--- OBSERVATION_PRIOR end			
}	--- ORDER_PRIOR end			
}]	--- PRIOR_RESULT end			
]	--- OBSERVATION REQUEST end			
}	--- ORDER end			
}	--- CONTAINER end			
}	--- SPECIMEN end			

Field MSH-9 - Message Type (MSG) shall have its three components respectively valued to "OML", "O35" and "OML_O35".

The conditions on the OBSERVATION segment group are the same as for message OML^O21.

The SAC segment below the SPM segment is mandatory in OML^O35 message structure.

4.5.8 ORL^O36 static definition

Table 4.5-6 : ORL^O36

Segment	Meaning	Usage	Card.	HL7
MSH	Message header	R	[1..1]	2
MSA	Message Acknowledgement	R	[1..1]	2
[{ERR}]	Error	O	[0..*]	2
[PID]	Patient Identification	O	[0..1]	3
{	--- SPECIMEN begin			
SPM	Specimen	R	[1..*]	7
{	--- CONTAINER begin	R	[1..*]	
SAC	Specimen Container	R	[0..*]	13
[{	--- ORDER begin	R	[1..*]	
ORC	Common Order	R	[1..*]	4
[{TQ1}]	Timing/Quantity	RE	[0..1]	4
[OBR]	Observation Request	R	[1..1]	4
}]	--- ORDER end			
}	--- CONTAINER end			
}	--- SPECIMEN end			

1120

MSH-9 - Message Type (MSG) shall have its three components respectively valued to "ORL", "O36" and "ORL_O36".

The SAC segment below the SPM is mandatory in ORL^O36 message structure.

4.5.9 Specific segments description for transaction LAB-1

4.5.9.1 OBR - Observation Request Segment

HL7 v2.5: chapter 4 (4.5.3)

Table 4.5-7 : OBR - Observation Request Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
2	22	EI	R	[1..1]		00216	Placer Order Number
3	22	EI	RE	[0..1]		00217	Filler Order Number
4	250	CE	R	[1..1]		00238	Universal Service Identifier
5	2	ID	X	[0..0]		00239	Priority – OBR
6	26	TS	X	[0..0]		00240	Requested Date/Time
7	26	TS	X	[0..0]		00241	Observation Date/Time #
8	26	TS	X	[0..0]		00242	Observation End Date/Time #
9	20	CQ	X	[0..0]		00243	Collection Volume *
10	250	XCN	RE	[0..*]		00244	Collector Identifier *
11	1	ID	RE	[0..1]	0065	00245	Specimen Action Code *
12	250	CE	X	[0..0]		00246	Danger Code
13	300	ST	X	[0..0]		00247	Relevant Clinical Information
14	26	TS	X	[0..0]		00248	Specimen Received Date/Time *
15	300	SPS	X	[0..0]		00249	Specimen Source
16	250	XCN	R	[1..1]		00226	Ordering Provider
17	250	XTN	RE	[0..2]		00250	Order Callback Phone Number
18	60	ST	X	[0..0]		00251	Placer Field 1
19	60	ST	X	[0..0]		00252	Placer Field 2
20	60	ST	X	[0..0]		00253	Filler Field 1 +
21	60	ST	X	[0..0]		00254	Filler Field 2 +
22	26	TS	X	[0..0]		00255	Results Rpt/Status Chng - Date/Time +
23	40	MOC	X	[0..0]		00256	Charge to Practice +
24	10	ID	C	[0..1]	0074	00257	Diagnostic Serv Sect ID
25	1	ID	C	[0..1]	0123	00258	Result Status +
26	400	PRL	X	[0..0]		00259	Parent Result +
27	200	TQ	X	[0..0]		00221	Quantity/Timing
28	250	XCN	C	[0..*]		00260	Result Copies To
29	200	EIP	X	[0..0]		00261	Parent
30	20	ID	X	[0..0]	0124	00262	Transportation Mode
37	4	NM	X	[0..1]		01028	Number of Sample Containers *
40	250	CE	X	[0..0]		01031	Transport Arrangement Responsibility
41	30	ID	X	[0..0]	0224	01032	Transport Arranged
42	1	ID	X	[0..0]	0225	01033	Escort Required
43	250	CE	X	[0..0]		01034	Planned Patient Transport Comment
48	250	CWE	X	[0..0]	0476	01646	Medically Necessary Duplicate Procedure Reason.

1130

OBR-2 Placer Order Number (EI), required in transaction LAB-1.

Note that all batteries/tests contained in the order should be assigned a unique Placer Order Number. The same identifier will never be used twice by the Order Placer. The Placer Order Number is generated by the Order Placer actor and should be unique across all OBR segments across all messages. Please refer to section 2.3.6.1 for the details of the data type.

OBR-3 Filler Order Number (EI), required if available.

Note that all batteries/tests contained in the filler order should be assigned a unique Filler Order Number. The same identifier will never be used twice by the Order Filler. The filler order number is generated by the Order Filler actor and should be unique across all OBR segments across all messages. Please refer to section 2.3.6.1 for the details of the data type.

OBR-4 Universal Service Identifier (CE), required

This field contains one ordered battery or test. A battery is composed of one or more tests or one or more batteries.

OBR-5 Priority and OBR-6 Requested Date/Time

These two fields are not supported. See TQ1 segment.

OBR-7, OBR-8, OBR-12, OBR-14, OBR-15 These fields are not supported. See SPM segment that supersedes them.

OBR-10 Collector Identifier, required if available.

This repeatable field contains the specimen collectors' identification.

OBR-11 Specimen Action Code (ID), required if available.

The value of this field is dependent on the use case as described in Volume 1.

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

HL7 Table 0065 - Specimen Action Code gives the valid values:

Table 4.5-8 : HL7 Table 0065 - Specimen Action Code

Value	Description	Comment
A	Add ordered tests to the existing specimen	
G	Generated order; reflex order	
L	Lab to obtain specimen from patient	
O	Specimen obtained by service other than Lab	
P	Pending specimen; Order sent prior to delivery	
R	Revised order	
S	Schedule the tests specified below	

OBR-13 Relevant Clinical information (ST), not supported.

Transaction LAB-1 uses OBX segment to carry relevant clinical information, or a NTE segment below the OBR for more comment orientated information.

OBR-16 Ordering Provider (XCN), required.

OBR-17 Order Callback Phone Number (XTN), required if available. One or two phone numbers.

OBR-22 Results Rpt/Status Chng - Date/Time (TS), not used in LAB-1: OBR-22 is related to the RESULT, not to the ORDER. OBR-22 is related to OBR-25. ORC-9 contains the date/time of the latest status change of the ORDER.

OBR-24 Diagnostic Serv Sect ID (ID), conditional

Condition predicate: This field may be valued in OML messages sent by the Order Filler. In other words this field is RE for the order filler actor. The valid values are defined in HL7 Table 0074 - Diagnostic Service Section ID. The table below presents a subset of these valid values as identified in Volume 1.

Table 4.5-9 : HL7 Table 0074 - Diagnostic Service Section ID (subset)

Value	Description	Addressed by Laboratory TF 2003 - 2004
BG	Blood Gases	Yes
CH	Chemistry	Yes
CP	Cytopathology	
HM	Hematology	Yes
IMM	Immunology	Yes
LAB	Laboratory	Yes
MB	Microbiology	Yes
MCB	Mycobacteriology	Yes
MYC	Mycology	Yes
OSL	Outside Lab	
SR	Serology	Yes
TX	Toxicology	Yes
VR	Virology	Yes

OBR-25 Order Result Status (ID), Conditional.

Condition predicate: This field shall not be filled in messages sent by the Order Placer. This field shall be filled in messages sent by the Order Filler, according to HL7 Table 0123 described in Chapter 7 of HL7. In this version of the Laboratory Technical Version, the possible values for this field are a subset of this table:

HL7 Table 0123 - Result Status

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

Note: For the conditions of use of these values, please read section 3.12 “Correlations of status between ORC, OBR and OBX”.

OBR-28 Result Copies To (XCN), conditional.

HL7 Definition: This field identifies the people who are to receive copies of the results. By local convention, either the ID number or the name may be absent.

Condition predicate: The Order Placer shall fill this field when it sends a new order for which there are persons or care units declared for receiving a copy of the results.

5 Transaction LAB-2: Filler Order Management

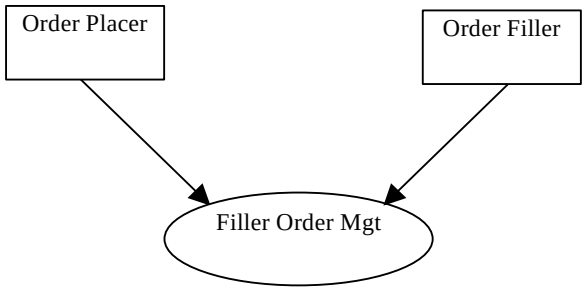
5.1 Scope

This transaction is used by the general use case "*Filler order with specimens identified by third party or collected by the laboratory*" described in the Volume 1 of this technical framework. It corresponds to Transaction 2 of the IHE Laboratory Technical Framework. It is used by the Order Filler (Laboratory Information System) and the Order Placer.

This transaction is used by the Order Filler to place a new order to the Order Placer. The order contains a list of batteries or tests to be fulfilled, using biological specimens collected from the subject. A battery contains one or more tests, each of which may produce one or more observations.

The main goal of the Filler Order Management Transaction is to allow consistent management of the order, (content and status), between the Order Filler and Order Placer actors.

5.2 Use Case Roles



Actor :Order Placer

Roles : Receives filler orders. Notifies the Order Filler of acceptance or refusal. Notifies the Order Filler of the placer order number if the filler order was accepted.

Actor :Order Filler

Roles : Places filler orders by sending them to the Order Placer. Receives acceptance or rejection from the Order Placer. Receives the placer order reference number from the Order Placer if the Order Placer accepts the order. Receives order related changes from the Order Placer.

5.3 Referenced standards

HL7 version 2.5:

- Chapter 2: "Control" --> generic segments and data types
- Chapter 3: "ADT" --> PID and PV1 segments
- Chapter 4: "Order Entry" --> OML and ORL messages

- Chapter 7: "Observation Reporting" --> SPM segment
- Chapter 13: "Clinical Laboratory Automation" --> SAC segment

5.4 Interaction diagrams

Trigger events: In all interactions below, the initiator chooses the best OML message structure appropriate to its orders. The responder SHALL respond with the related ORL message structure:

OML^O21 → ORL^O22
OML^O33 → ORL^O34
OML^O35 → ORL^O36

An OML message shall be responded to with exactly 1 ORL message.

ORL messages SHALL be created by the Order Placer application, and not by a message broker. The message broker (an intermediary between the Order Filler and the Order Placer) has no knowledge of the tests being requested and can't assign identification numbers on behalf of the Order Placer.

5.4.1 Process of a filler order

The figure below shows the flow of messages in the normal process of a filler order. A Filler Order is placed, and responded to by either a rejection or acceptance.

Note that the creation of a filler order may be triggered by a prior placer order, e.g. if the results of one of the previously ordered tests triggers the laboratory to perform additional tests. The creation of a filler order could also happen during the quality control performed by the laboratory on a new order received from the Order Placer: the laboratory may then decide that some extra battery that was not ordered should be added, e.g. regarding the pathology context.

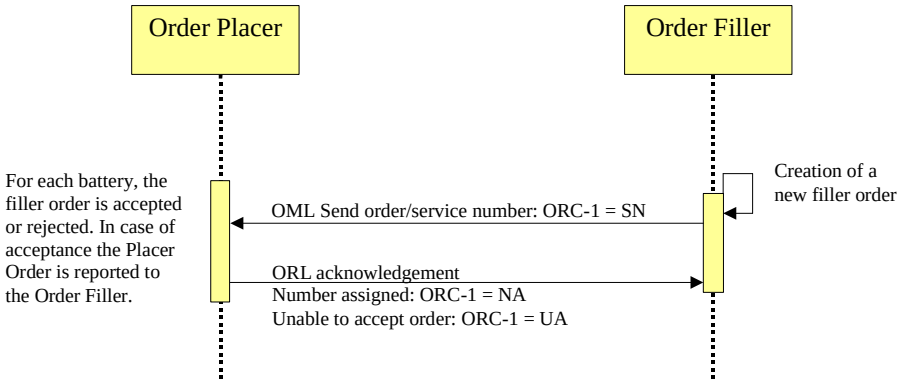


Figure 5.4-1: Process of a filler order

5.5 Messages static definitions

5.5.1 Available HL7 2.5 structures for OML message

HL7 v2.5 chapter 4, offers three different message structures for the OML message type. Transaction LAB-2 allows all message types to be used that are used by transaction LAB-1. See paragraph 4.5.1. for a detailed description.

5.5.2 Restrictions on OML message for transaction LAB-2

This cycle of Laboratory Technical Framework supports multiple message structures as defined above, and makes the following restrictions for transaction LAB-2:

- Restricts timing/quantity to one instance per order (i.e. there's one iteration of the TQ1 segment related to an OBR). The main reason for this choice is that collecting the specimens is not delegated to a separate actor in this cycle of the IHE Laboratory Technical Framework. The collection process is part of either the Order Placer or the Order Filler. See the explanation given in LAB-1 section.

5.5.3 OML and ORL messages static definition

The static definition of the messages in LAB-2 are equal to the static definition for LAB-1. See paragraph 4.5.3. up to paragraph 4.5.8. for details.

5.5.4 Specific segments description for transaction LAB-2

5.5.4.1 OBR - Observation Request Segment

HL7 v2.5: chapter 4 (4.5.3)

Table 5.5-1 : OBR - Observation Request Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
2	22	EI	X	[0..0]		00216	Placer Order Number
3	22	EI	R	[1..1]		00217	Filler Order Number
4	250	CE	R	[1..1]		00238	Universal Service Identifier
5	2	ID	X	[0..0]		00239	Priority – OBR
6	26	TS	X	[0..0]		00240	Requested Date/Time
7	26	TS	X	[0..0]		00241	Observation Date/Time #
8	26	TS	X	[0..0]		00242	Observation End Date/Time #
9	20	CQ	X	[0..0]		00243	Collection Volume *
10	250	XCN	RE	[0..*]		00244	Collector Identifier *
11	1	ID	RE	[0..1]	0065	00245	Specimen Action Code *
12	250	CE	X	[0..0]		00246	Danger Code
13	300	ST	X	[0..0]		00247	Relevant Clinical Information
14	26	TS	X	[0..0]		00248	Specimen Received Date/Time *
15	300	SPS	X	[0..0]		00249	Specimen Source
16	250	XCN	RE	[0..1]		00226	Ordering Provider
17	250	XTN	RE	[0..2]		00250	Order Callback Phone Number
18	60	ST	X	[0..0]		00251	Placer Field 1

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
19	60	ST	X	[0..0]		00252	Placer Field 2
20	60	ST	X	[0..0]		00253	Filler Field 1 +
21	60	ST	X	[0..0]		00254	Filler Field 2 +
22	26	TS	X	[0..0]		00255	Results Rpt/Status Chng - Date/Time +
23	40	MOC	X	[0..0]		00256	Charge to Practice +
24	10	ID	RE	[0..1]	0074	00257	Diagnostic Serv Sect ID
25	1	ID	X	[0..0]	0123	00258	Result Status +
26	400	PRL	X	[0..0]		00259	Parent Result +
27	200	TQ	X	[0..0]		00221	Quantity/Timing
28	250	XCN	C	[0..*]		00260	Result Copies To
29	200	EIP	X	[0..0]		00261	Parent
30	20	ID	X	[0..0]	0124	00262	Transportation Mode
37	4	NM	X	[0..1]		01028	Number of Sample Containers *
40	250	CE	X	[0..0]		01031	Transport Arrangement Responsibility
41	30	ID	X	[0..0]	0224	01032	Transport Arranged
42	1	ID	X	[0..0]	0225	01033	Escort Required
43	250	CE	X	[0..0]		01034	Planned Patient Transport Comment
48	250	CWE	X	[0..0]	0476	01646	Medically Necessary Duplicate Procedure Reason.

OBR-2 Placer Order Number (EI), not allowed in transaction LAB-2.

Transaction LAB-1 has to be used if the Placer Order Number is known. Please refer to section 2.3.6.1 for the details of the data type.

OBR-3 Filler Order Number (EI), required.

Note that all batteries/tests contained in the filler order should be assigned a unique identifier. The same identifier will never be used twice. The filler order number should be unique across all OBR segments across all messages ever sent by the order filler. Please refer to section 2.3.6.1 for the details of the data type.

OBR-4 Universal Service Identifier (CE), required

This field contains one ordered battery or test. A battery is composed of one or more tests or one or more batteries.

OBR-5 Priority and OBR-6 Requested Date/Time

These two fields are not supported. See TQ1 segment.

OBR-7, OBR-8, OBR-12, OBR-14, OBR-15 These fields are not supported. See SPM segment for fields that supersedes them.

OBR-10 Collector Identifier, required if available.

This repeatable field contains the specimen collectors' identification.

OBR-11 Specimen Action Code (ID), required if available.

The value of this field is dependent on the use case as described in volume 1.

The field identifies the action to be taken with respect to the specimens that accompany or precede this order. The purpose of this field is to further qualify (when appropriate) the

general action indicated by the order control code contained in the accompanying ORC segment.

HL7 Table 0065 - Specimen Action Code gives the valid values:

Table 5.5-2 : HL7 Table 0065 - Specimen Action Code

Value	Description	Comment
G	Generated order; filler order	

OBR-13 Relevant Clinical information (ST), not supported.

Instead of OBR-13, transaction LAB-2 uses OBX segment to carry relevant clinical information, or a NTE segment below the OBR for more comment orientated information.

1300 **OBR-16 Ordering Provider (XCN)**, required if available.

OBR-17 Order Callback Phone Number (XTN), required if available. One or two phone numbers.

OBR-24 Diagnostic Serv Sect ID (ID), required if available.

The valid values are defined in HL7 Table 0074 - Diagnostic Service Section ID. The table below presents a subset of these valid values as identified in volume 1.

Table 5.5-3 : HL7 Table 0074 - Diagnostic Service Section ID (subset)

Value	Description	Addressed by Laboratory TF 2003 - 2004
BG	Blood Gases	Yes
CH	Chemistry	Yes
CP	Cytopathology	
HM	Hematology	Yes
IMM	Immunology	Yes
LAB	Laboratory	Yes
MB	Microbiology	Yes
MCB	Mycobacteriology	Yes
MYC	Mycology	Yes
OSL	Outside Lab	
SR	Serology	Yes
TX	Toxicology	Yes
VR	Virology	Yes

OBR-28 Result Copies To (XCN), conditional.

HL7 Definition: This field identifies the persons who are to receive copies of the results. By
1310 local convention, either the ID number or the name may be absent.

Condition predicate: If there are known individuals or care units that should receive a copy of results related to this order, they should be listed here.

6 Transaction LAB-3: Order Results Management

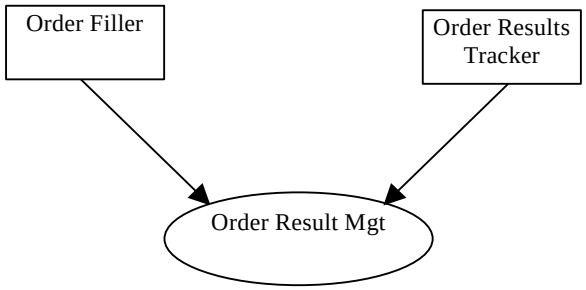
This section corresponds to Transaction 3 of the IHE Laboratory Technical Framework. It is used by the Order Filler (Laboratory Information System) and the Order Result Tracker.

6.1 Scope

This transaction notifies the Order Result Tracker of requested tests upon creation of an order or reception of a specimen in the laboratory. It transmits the observation results from the Order Filler to the Order Result Tracker, when a result is acquired, clinically validated, modified or deleted at the Order Filler level. Another goal of this transaction is to provide the Order Result Tracker with the complete sorted set of results related to a placer order or a placer order group. The Order Result Tracker shall store these results in the sorting order given by the Order Filler.

In order to maintain consistency between order and result messages, the result messages of transaction T3 should refer to primary specimen even in case some of the observations are performed on secondary samples that are derived from primary specimen after specific preparation.

6.2 Use Case Roles



Actor: Order Filler

Roles: Provides notification to the Order Result Tracker for specimen arrival, acquisition of technically validated results, clinical validation of results, modification/cancellation of results and deletion of tests. Provides the complete sorted set of results related to a placer order or a placer order group.

Actor: Order Result Tracker

Roles: Receives test order and results from the Order Filler, gives access to this order and results to the healthcare enterprise, respects the sorting order of the results as received from the Order Filler.

6.3 Referenced standards

Although the HL7 "ORU" message allows to transfer most laboratory observations, it requires in frequent cases to use Child "OBR" segments that are difficult to manage both for the Order Filler and the Order Result Tracker applications. This is the main reason why IHE has chosen HL7 "OUL" messages instead of “ORU”.

HL7 version 2.5:

- Chapter 2: "Control" --> generic segments and data types
- Chapter 3: "Patient Administration" --> PID and PV1 segments
- Chapter 4: "Order Entry" --> OBR segment
- Chapter 7: "Observation Reporting" --> OUL messages

6.4 Interaction diagrams

6.4.1 Normal process for management of results of a filler order

The figures below show the flow of messages that occurs during normal process of a filler order, from the reception of specimen or entry of the order in the laboratory, up to the completion of this order and visualization of results by an end user on the Order Result Tracker. For each triggering event of an OUL message, the value of the result status of the OBR (OBR-25) is indicated.

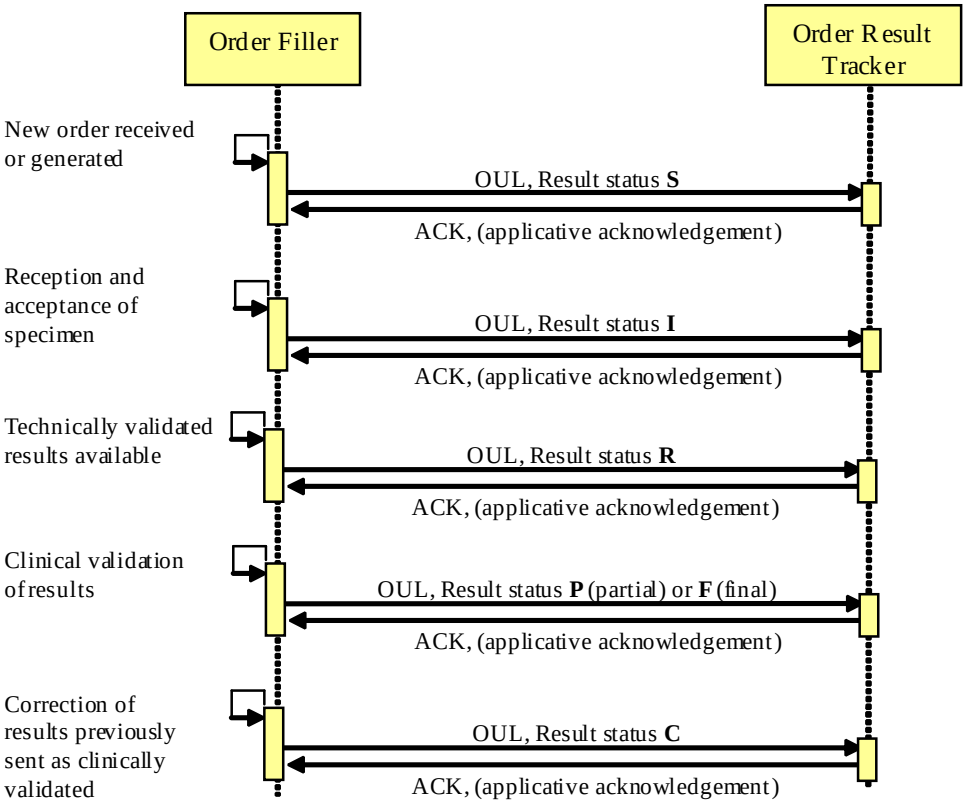


Figure 6.4-1: Normal process for management of results of a filler order

The decision whether to deliver or not technically validated results (using OBR-25 "Result Status" "R") to the Order Result Tracker is driven by organization rules specific to each healthcare enterprise. These rules may take account of the order priority (TQ1-9), the ordering provider, the particular ordered battery, the executing laboratory, the observation result itself… The IHE Laboratory Technical Framework does not make any assertion on these rules. It only states that an Order Filler MUST be able to send all the result statuses

mentioned in the above diagram, and doing so, MUST conform to the correlation diagrams and transition diagrams presented in section 3.12.

The same remark applies to the sending of partial clinically validated results (using OBR-25 "Result Status" "P").

6.4.2 Deletion of Battery/Test in a filler order

At any time during the process described in figure 6.4.1, a test/battery of the order can be deleted from the filler order, which should trigger a message to the Order Result Tracker as shown below.

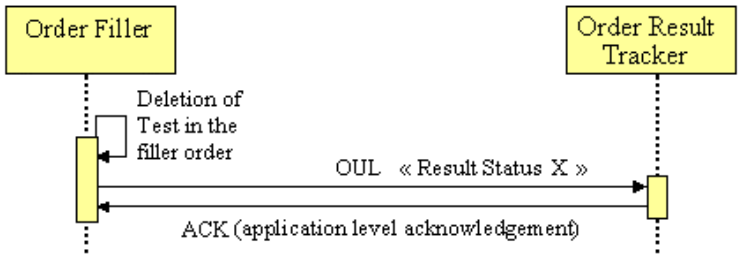


Figure 6.4-2: Deletion of a test by Order Filler

6.4.3 Addition of Battery/Test in a filler order

At any time during the process described in figure 6.4.1, a test/battery of the order can be added in the filler order, which should trigger a message to the Order Result Tracker as shown below.

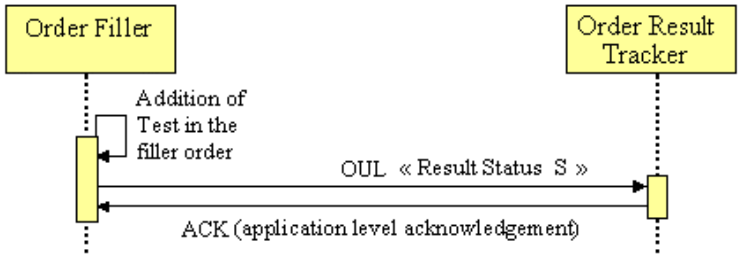


Figure 6.4-3: Addition of a test by Order Filler

6.5 Messages static definitions

6.5.1 OUL : Unsolicited Laboratory Observation message

The following events from an Order Filler (LIS) will trigger an Unsolicited Laboratory Observation (OUL) message to the Order Result Tracker:

- Entry of an Order at the laboratory level for an already collected specimen
- Reception and acceptance of a specimen
- Acquisition of results that are technically validated

- Clinical validation of results
- Modification of already transmitted results
- Cancellation of results
- Addition/Deletion of tests

Among the different types of OUL messages that are described in HL7 Chapter 7, two different types of OUL messages should be considered depending on the specialty of the laboratory or more precisely to the type of observation/specimen:

- The OUL – Unsolicited Specimen Oriented Observation Message - (Event R22).
- The OUL – Unsolicited Order Oriented Observation Message - (Event R24)

The OUL^R22 message structure shall be used for all orders for which each ordered battery requires a single specimen.

The OUL^R24 message structure shall be used when an ordered battery requires multiple specimens (e.g. glucose tolerance test, creatinine clearance).

In both message structures the order in which the OBX segments appear defines the sorting order for the presentation of the results for a given battery or specimen. In this respect, the Order Filler shall transmit all available results for the battery or specimen in recapitulative mode whether they have already been transmitted or not.

6.5.1.1 OUL^R22 static definition

Table 6.5-1 : OUL^R22 static definition

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message Header	R	[1..1]	2
[	--- PATIENT begin	O	[0..1]	
PID	Patient Identification	R	[1..1]	3
[PV1]	Patient Visit	RE	[0..1]	3
]	--- PATIENT end			
[{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen	R	[1..1]	7
[{OBX}]	Observation related to specimen	O	[0..*]	
[{	--- ORDER begin	R	[1..*]	
OBR	Observation Request	R	[1..*]	4
[ORC]	Common Order (for one specimen)	R	[1..1]	4
[{TQ1}]	Timing Quantity	RE	[0..1]	4
[{	--- RESULT begin	O	[0..*]	
OBX	Observation related to OBR	R	[1..*]	7
[{NTE}]	Comment of the result	C	[0..*]	2
}]	--- RESULT end			
}]	--- ORDER end			
}]	--- SPECIMEN end			

Field MSH-9 – Message Type shall have its three components valued as follows: OUL^R22^OUL_R22

For specimen oriented observation message, additional parameters that are related to the specimen (e.g.: Anatomic origin, Collection procedure) should be transmitted in OBX segments that immediately follow the SPM segment..

For each set of observations (e.g. Microscopy; Culture; Antibiotic Susceptibility) the Order Filler should generate an OBR segment that identifies the Observation followed by a series of OBX segments, each of them carrying the result of an individual test/observation.

Following the SPM segment, the Order Filler should systematically transmit in the OUL message, all OBR and OBX segments related to this SPM. This systematic transmission of all observations linked to an SPM segment and their respective status may help the Order Result Tracker to recover from an error situation, when for some hazardous reasons a previous OUL message for the same request could not have been properly processed. For the same reason the "U" value should not be used in the Observation Result Status field of an OBX segment (see description of this segment in section 3.11of this document).

In case an observation previously transmitted is deleted, the Order Filler should transmit all OBX segments linked to the OBR to which the deleted observation relates to; and it should indicate the current status of each OBX segment. The Observation Result Status field of the OBX that correspond to the deleted observation should be valued with a "D".

Unless the Report Status field (OBR-25) of the OBR is valued with an "X" (deleted battery), the OBR segment shall always be followed by one or several OBX segments.

TQ1 and ORC segments shall be transmitted because they contain important information such as the priority of the order and the order group number.

6.5.1.2 OUL^R24 static definition

Table 6.5-2 : OUL^R24 static definition

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message Header	R	[1..1]	2
[	--- PATIENT begin	O	[0..1]	
PID	Patient Identification	R	[1..1]	3
[PV1]	Patient Visit	RE	[0..1]	3
]	--- PATIENT end			
{	--- ORDER begin	R	[1..*]	
OBR	Observation Request	R	[1..1]	4
[ORC]	Common Order (for one battery)	R	[1..1]	4
[{TQ1}]	Timing Quantity	RE	[0..1]	4
[{	--- SPECIMEN begin	O	[0..*]	
SPM	Specimen	R	[1..1]	7
[{OBX}]	Observation related to specimen	O	[0..*]	
}]	--- SPECIMEN end			
[{	--- RESULT begin	R	[1..*]	
OBX	Observation related to OBR	R	[1..1]	7
[{NTE}]	Comment of the result	C	[0..*]	2
}]	--- RESULT end			
}	--- ORDER end			

Field MSH-9 – Message Type shall have its three components valued as follows: OUL^R24^OUL_R24

Depending on the requested test, additional parameters may be needed such as, patient height, weight or last menstrual period. These data that are results of observation not related to any specimen but generally related to the patient; should be transmitted in a series of OBX segments that immediately follows the OBR segment and that precedes the first SPM segment related to the requested battery.

Although in most of cases there is only one specimen related to the OBR segment, for batteries such as Creatinine Clearance or Glucose Tolerance test, there may be several specimens related to the OBR. In such a case, each SPM segment is followed by OBX segment(s) of observation(s) related to this particular specimen.

OBX that carry results of a calculation (e.g. Creatinine Clearance) that involves observation values related to several specimens should be placed after the last observation related to the last specimen.

Following the OBR, the Order Filler should systematically transmit in the OUL message, all OBX and SPM segments related to this OBR. This systematic transmission of all observations linked to an OBR and their respective status may help the Order Result Tracker to recover from error situation, when for some hazardous reasons a previous OUL message for the same request could not have been properly processed. For the same reason the "U" value should not be used in the Observation Result Status field of an OBX segment (see description of this segment in Chapter 3.11 earlier in this document).

In case an observation previously transmitted is deleted, the Order Filler should transmit all OBX segments linked to the OBR to which the deleted observation relates to; and it should indicate the current status of each OBX segment. The Observation Result Status field of the OBX that correspond to the deleted observation should be valued with a "D".

Unless the Report Status field (OBR-25) of the OBR is valued with an "X" (deleted battery), the OBR segment shall always be followed by one or several SPM and OBX segments.

TQ1 and ORC segments shall be transmitted because they contain important information such as the priority of the order and the order group number.

6.5.1.2.1 OBR Segment

The OUL message corresponding to an Order should contain as many OBR segments as requested batteries or requested tests involved by the triggering event of the message. For example, upon reception of a specimen in the laboratory, the Order Filler (LIS) will generate an OUL message that contains as many OBR segments as batteries or tests requested for this specimen. The modification of a result of an observation will trigger an OUL message that contains the OBR segment for the battery that includes this observation.

Table 6.5-3 : OBR segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
2	22	EI	RE	[0..1]		00216	Placer Order Number
3	22	EI	R	[1..1]		00217	Filler Order Number
4	250	CE	R	[1..1]		00238	Universal Service Identifier
5	2	ID	X	[0..0]		00239	Priority – OBR
6	26	TS	X	[0..0]		00240	Requested Date/Time
7	26	TS	X	[0..0]		00241	Observation Date/Time

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
8	26	TS	X	[0..0]		00242	Observation End Date/Time
9	20	CQ	X	[0..0]		00243	Collection Volume
10	250	XCN	RE	[0..1]		00244	Collector Identifier
11	1	ID	C	[0..1]	0065	00245	Specimen Action Code
12	250	CE	X	[0..0]		00246	Danger Code
13	300	ST	X	[0..0]		00247	Relevant Clinical Information
14	26	TS	X	[0..0]		00248	Specimen Received Date/Time
15	300	SPS	X	[0..0]		00249	Specimen Source or Segment SPM
16	250	XCN	RE	[0..1]		00226	Ordering Provider
17	250	XTN	X	[0..0]		00250	Order Callback Phone Number
18	60	ST	X	[0..0]		00251	Placer Field 1
19	60	ST	X	[0..0]		00252	Placer Field 2
20	60	ST	X	[0..0]		00253	Filler Field 1
21	60	ST	X	[0..0]		00254	Filler Field 2
22	26	TS	X	[0..0]		00255	Results Rpt/Status Chng – Date/Time
23	40	MOC	X	[0..0]		00256	Charge to Practice
24	10	ID	R	[0..0]	0074	00257	Diagnostic Serv Sect ID
25	1	ID	R	[1..1]	0123	00258	Order Result Status
26	400	PRL	X	[0..0]		00259	Parent Result
27	200	TQ	X	[0..0]		00221	Quantity/Timing
28	250	XCN	RE	[0..*]		00260	Result Copies To
29	200	EIP	X	[0..0]		00261	Parent
30	20	ID	X	[0..0]	0124	00262	Transportation Mode
31	250	CE	X	[0..0]		00263	Reason for Study
32	200	NDL	C	[0..1]		00264	Principal Result Interpreter
33	200	NDL	X	[0..0]		00265	Assistant Result Interpreter
34	200	NDL	X	[0..0]		00266	Technician
37	4	NM	X	[0..0]		01028	Number of Sample Containers *
38	250	CE	X	[0..0]		01029	Transport Logistics of Collected Sample
39	250	CE	X	[0..0]		01030	Collector's Comment *
40	250	CE	X	[0..0]		01031	Transport Arrangement Responsibility
41	30	ID	X	[0..0]	0224	01032	Transport Arranged
42	1	ID	X	[0..0]	0225	01033	Escort Required
43	250	CE	X	[0..0]		01034	Planned Patient Transport Comment
44	250	CE	X	[0..0]	0088	00393	Procedure Code
45	250	CE	X	[0..0]	0340	01316	Procedure Code Modifier
46	250	CE	X	[0..0]	0411	01474	Placer Supplemental Service Information
47	250	CE	X	[0..0]	0411	01475	Filler Supplemental Service Information
48	250	CWE	X	[0..0]	0476	01646	Medically Necessary Duplicate Procedure Reason.
49	2	IS	X	[0..0]	N	01647	Result Handling

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OBR-2 Placer Order Number (EI)

This field is required if the value is known to the sender. See section 2.3.6.1 for the details of the data type. In case of a Filler Order, the value of this field will be known to the sender after transaction LAB-2 Filler Order Management (section 5.4.1) has taken place.

OBR-3 Filler Order Number (EI)

This field is required. It allows the Order Result Tracker to link all the Tests/results of a request together. It also identifies the order at the Order Filler level. Please refer to section 2.3.6.1 for the details of the data type.

OBR-4 Universal Service Identifier (CE), required

The first three sub-fields "Identifier", "Text" and "Name of Coding System" are required.

The second sub-field "Text" allows the Order Result Tracker to manage the results without the help of Battery Master File.

The last three sub-fields are optional.

OBR-7 Observation Date/Time (TS)

Since all observations linked to a requested battery or test, are not necessarily performed at the same time, this field should not be used. Date and time of observation (OBX-14) should be used instead.

OBR-9 Collection Volume (CQ)

Since when it is needed by the laboratory and reported, the volume of collection is the result of an observation (sometimes done by the Order Placer) that can be used for calculation of other results (e.g. Creatinine Clearance); this information should be transferred in an OBX segment as all other results of observation. This field OBR-9 should consequently not be used in this transaction.

OBR-10 Collector Identifier (XCN)

This field identifies the person, department or facility that collected the specimen(s).

OBR-11 Specimen Action Code (ID)

This field is only required in the following events:

- The order is entered at the Order Filler (LIS) level as described in section 3.1.3 of Laboratory Technical Framework Volume 1. The value of the Action Code is A.
- The battery or test has been added by the Order Filler (LIS) for confirmation of a diagnostic (reflex testing); value G.

In all other triggering events of this transaction, this Action Code field is meaningless.

OBR-12 Danger Code (CE)

This field should not be used in this first version of Laboratory Technical Framework.

OBR-13 Relevant Clinical Information (ST)

Since it is stated in the HL7 V2.5 Chapter 7 that "for some orders this information may be sent on a more structured form as a series of OBX segments (see HL7 V2.5 Chapter 7) that immediately follow the order segment", it is preferable and more consistent to systematically use OBX segments in OUL message for sending Clinical Information.

OBR-14 Specimen Received Date/Time (TS)

This field should not be used; this information should be transmitted in an SPM segment.

OBR-15 Specimen Source (SPS)

As for OBR-13, if this information needs to be transmitted to the Order Result Tracker it is more consistent to transfer it in an OBX segment. This field should not be used.

OBR-16 Ordering Provider (XCN)

This field is required if it was part of the order sent by the Order Placer.

OBR-24 Diagnostic Serv Sect ID (ID)

This field is required. In case the Order Result Tracker receives part of the results of an entire order at different time, the Order Result Tracker can use this field for presenting all the batteries/test with the same Diagnostic Serv. Sect. ID together.

OBR-25 Result Status (ID)

This field is required and should be filled according to HL7 Table 0123 described in Chapter 4. Depending on the triggering event of the OUL message the possible values for this field are:

- Value I is used to indicate reception of specimen(s) at the laboratory. In case a battery or test requires more than one specimen (e.g. Creatinine clearance) this I status has to be used when all the required specimens have been received. An OBR segment with this I status may be followed by OBX segments that contains result of observations performed at specimen collection time (e.g. Volume of collected specimen).
- Value R, to indicate that some results are available and technically validated but not yet clinically validated.
- Value P, to indicate that some of the results, but not all, are available and have been clinically validated. The identity of the Clinical Expert should in this case be indicated in the OBR-32 field.
- Value F, to indicate that all results are available and have been clinically validated. The identity of the Clinical Expert should in this case be indicated in the OBR-32 field.
- Value C, to indicate that at least one result contained in one of the following OBX segments has been modified after the results have been transmitted with the F status. This C value should never be used before results have been transmitted with the F status. Since a Corrected result is supposed to be clinically validated, the identity of the Clinical Expert should be indicated in the OBR-32 field when the value of the Result Status is C.
- Value X, to indicate that the battery/test has been deleted. This deletion could have been, either received from the Order Placer for an already received specimen and accepted by the Order Filler, or decided by the laboratory. This value X should not be used if some results for this test have already been transmitted.
- Value S, although the usage of this value is mainly in response to a Query message. It can be used in OUL messages for tests that have been added to the original request by the Order Filler (LIS). In this case, the value of the OBR-11 field (Action Code) should be either A, or G.

Note: For the conditions of use of these values, please read section 3.12 “Correlations of status between ORC, OBR and OBX”.

OBR-28 Result Copies To (XCN)

This field may be used to indicate the list of recipients who will receive a hard copy of the results report, which may be useful information for users who have access to these results.

OBR-32 Principal Result Interpreter (NDL)

This field is required when the value of the Results Status field (OBR-25) is P, F or C (corrected results are supposed to be verified). The field identifies who validated the results, where, and when this clinical validation was performed. It describes completely the “Clinical Validation” step.

OBR-33 Assistant Result Interpreter (NDL)

This field is meaningless when the value of the Result Status field is different from P, F or C.

OBR-34 Technician (NDL)

This field should not be used, as all observations linked to the battery have not necessarily been performed by the same Technician. The OBX-16 (Responsible Observer) should be used instead.

OBR-35 Transcriptionist (NDL)

This field is only applicable when the final report has been dictated and transcribed, which is frequent for Histology and Cytology reports.

OBR-36 Scheduled - Date/Time (TS)

This field is optional and only applies when the value of the Result Status field (OBR-25) is S.

OBR-44 Procedure Code (CE)

This field is in principle meaningless in an OUL message sent by a Laboratory but may be needed in some organizations.

OBR-45 Procedure Code Modifier (CE)

This field can be used only when OBR-44 (Procedure Code) is filled.

6.6 Acknowledgement of OUL messages

OUL Messages received by the Order Result Tracker shall generate a logical acknowledgement message from the Order Result Tracker to the Order Filler. This General Acknowledgement Message ‘ACK’ shall be built according to HL7 V2.5 standard.

7 Transaction LAB-4: Work Order Management

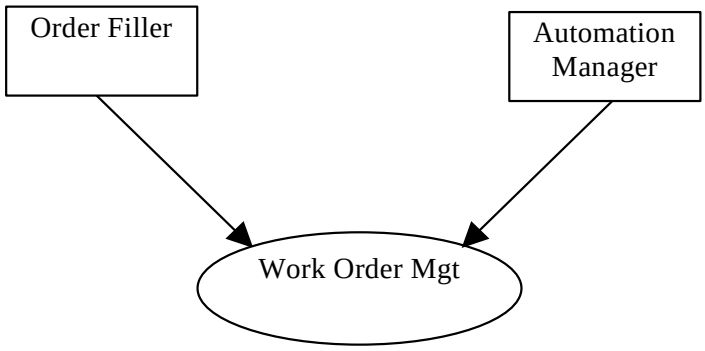
7.1 Scope

This transaction is used if the Order Filler issues a new order to the Automation Manager.

In addition, this transaction is used to cancel and/or modify an order that was previously sent to the Automation Manager.

It is also possible to cancel a previous order and send a new order to modify it.

7.2 Use case roles



Actor: Order Filler

The role: manages orders and takes care of the routing to the appropriate Automation Manager.

Actor: Automation Manager

The role: receives the orders from the order filler and manages the preprocessing, the analysis, and the post processing of the order.

7.3 Referenced standards

HL7 version 2.5 Chapter 4

7.4 Interaction diagrams

ORL messages SHALL be created by the Automation Manager application, and not by a message broker. The message broker (an intermediary between the Order Filler and the Automation Manager) has no knowledge of the tests being requested and can't accept/reject these test on behalf of the Automation Manager.

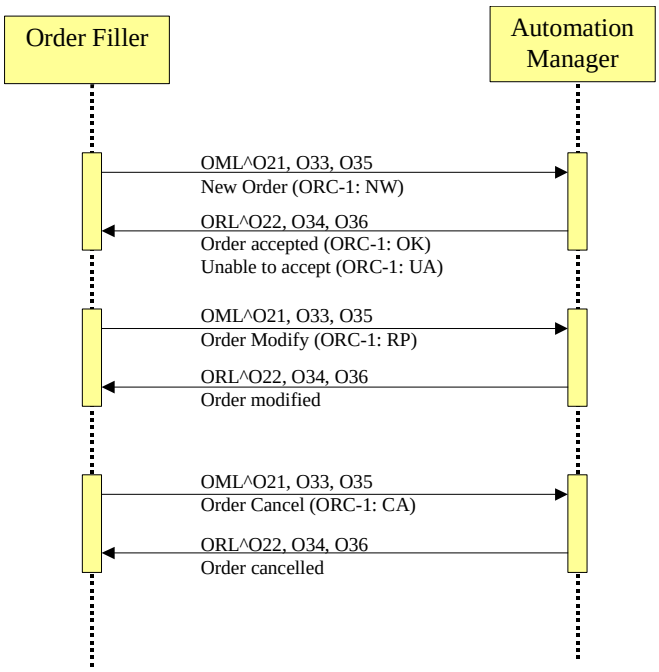


Figure 7.4-1: Normal process of ordering to Automation Manager

An OML message shall be responded to with exactly 1 ORL message.

Notes: ORM^O01 is not used, and OML^O21 bears the usage. ORR^O02 is not used either, and ORL^O22 bears the usage.

7.5 Messages static definitions

7.5.1 Laboratory Order Message (OML^O21, ORL^O22)

The following message is used for analytical messages where it is required that the Specimen/Container information is within ORC/OBR segment group.

7.5.1.1 Trigger events

OML(O21) : Work order sent by the Order Filler.

ORL (O22) : Acknowledgement of the Work Order sent by the Automation Manager.

7.5.1.2 Message semantics

Refer to the HL7 standard for the OML message of HL7 2.5 Chapter 4 and the general message semantics.

In addition, when the Order Filler sends a new work order to the Automation Manager, ORC-1 “Order Control Code” is valued with “NW”. When the work order is canceled, ORC-1 is valued with “CA”. The correction of the work order uses value “RP”.

The OBX segments are used to convey the patient’s previous results, as well as some observation provided by the Order Placer or by the Order Filler, such as: blood pressure, patient’s temperature, specimen collection volume…

Table 7.5-1: OML^021 Message

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message Header	R	[1..1]	2
[	--- PATIENT begin	O	[0..1]	
PID	Patient Identification	R	[1..1]	3
[PV1]	Patient Visit	RE	[0..1]	3
]	--- PATIENT end			
{	--- ORDER begin	R	[1..*]	
ORC	Common Order (for one battery)	R	[1..1]	4
[{TQ1}]	Timing Quantity	RE	[0..1]	4
[	--- OBSERVATION REQUEST begin	O	[0..1]	
OBR	Observation Request	R	[1..1]	4
[TCD]	Test Code Details	O	[0..1]	13
[{	--- OBSERVATION begin	O	[0..*]	
OBX	Observation Result	R	[1..1]	7
[{NTE}]	Comment of the result	C	[0..*]	2
}]	--- OBSERVATION end			
[{	--- SPECIMEN begin	C	[0..*]	
SPM	Specimen	R	[1..1]	7
[{	--- CONTAINER begin	C	[0..*]	
SAC	Specimen Container	R	[1..1]	13
[{OBX}]	Additional specimen characteristics	O	[0..*]	7
}]	--- CONTAINER end			
}]	--- SPECIMEN end			
]	--- OBSERVATION REQUEST end			
}	--- ORDER end			

Field MSH-9 – Message Type shall have its three components valued as follows: OML^O21^OML_O21

PV1 is optional in the LAB-4/LAB-5 segments since Automation manager and analytical instruments do not usually need the outpatient information.

The SPECIMEN group is required when the specimen has already been collected and prepared, and is registered in the Order Filler application. In this case, there is at least one SPM segment present in this group. Below each SPM segment, the condition of use of the SAC segment is the one described in the paragraph describing this segment, section 3.10.

If neither Automation Manager nor analytical instruments compare the test result with the previous result, ORC, OBR, and OBX for the previous result are not necessary.

The OBX segment in the OBSERVATION group is used for the vital signs if it is necessary for technical validation.

The OBX segment in the CONTAINER group is used when a rerun is ordered.

Table 7.5-2 : ORL^O22 Message

Segment	Meaning	Usage	Card.	HL7 chapter

MSH	Message header	R	[1..1]	2
MSA	Message Acknowledgement	R	[1..1]	2
[{ERR}]	Error	O	[0..*]	2
[	--- PATIENT begin	O	[0..*]	
PID	Patient Identification	R	[1..1]	3
]	--- PATIENT end			
{	--- ORDER begin	R	[1..*]	
ORC	Common Order	R	[1..*]	4
[{TQ1}]	Timing/Quantity	RE	[0..1]	4
[	--- OBSERVATION REQUEST begin	O	[0..1]	
OBR	Observation Request	R	[1..1]	4
[{	--- SPECIMEN begin	C	[0..*]	
SPM	Specimen	R	[1..1]	7
[{SAC}]	Specimen Container Details	C	[0..*]	7
}]	--- SPECIMEN end			
]	--- OBSERVATION end			
}]	--- OBSERVATION REQUEST end			
]	--- ORDER end			

Field MSH-9 – Message Type shall have its three components valued as follows: ORL^O22^ORL_O22

The PID, ORC and OBR segments are required in this message, to give back the filler order number (ORC-3 or OBR-3).

The use conditions of SPM/SAC are the same as that of OML^O21.

7.5.2 Laboratory Order for Multiple Orders Related to a Single Specimen (OML^O33, ORL^O34)

7.5.2.1 Trigger Events

OML (O33): Work order sent by the Order Filler.

ORL (O34): Acknowledgement of the Work Order sent by the Automation Manager.

The trigger event for this message is “any status change of a work order”. Such changes include submission of new orders, cancellations, updates, etc where multiple orders are associated with a single specimen, which may be carried in multiple containers.

7.5.2.2 Message semantics

Refer to the HL7 standard for the OML message of HL7 2.5 Chapter 4 and the general message semantics.

In addition, when the Order Filler sends a new work order to the Automation Manager, ORC-1 “Order Control Code” is valued with “NW”. When the work order is canceled, ORC-1 is valued with “CA”. The correction of the work order uses value “RP”.

The OBX segments are used to convey the patient’s previous results, as well as some observation provided by the Order Placer or by the Order Filler, such as: blood pressure, patient’s temperature, specimen collection volume…

Table 7.5-3: OML^O33

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message Header	R	[1..1]	2
[	--- PATIENT begin	O	[0..1]	
PID	Patient Identification	R	[1..1]	3
[PV1]	Patient Visit	RE	[0..1]	3
]	--- PATIENT end			
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen	R	[1..1]	7
[{SAC}]	Specimen Container	O	[0..*]	
{	--- ORDER begin	R	[1..*]	
ORC	Common Order (for one battery)	R	[1..1]	4
[{TQ1}]	Timing Quantity	RE	[0..1]	4
[	--- OBSERVATION REQUEST begin	O	[O..1]	
OBR	Observation Request	R	[1..1]	4
[TCD]	Test Code Details	O	[0..1]	13
[{OBX}]	Observation Result	C	[0..*]	7
{	--- PRIOR RESULT start	O	[0..*]	
[ORC]	Common order – prior result	O	[0..1]	4
OBR	Order detail – prior result	R	[1..1]	4
{OBX}	Observation/Result – prior result	R	[1..*]	
[{NTE}]	Comment of the result	C	[0..*]	2
}	--- PRIOR RESULT end			
]	--- OBSERVATION REQUEST end			
}	--- ORDER end			
}	--- SPECIMEN end			

Field MSH-9 – Message Type shall have its three components valued as follows: OML^O33^OML_O33

Table 7.5-4: ORL^O34

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
MSA	Message Acknowledgement	R	[1..1]	2
[{ERR}]	Error	O	[0..*]	2
[PID]	Patient Identification	O	[0..1]	3
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen	R	[1..1]	7
[{SAC}]	Specimen Container	O	[0..*]	13
[{	--- ORDER begin	O	[0..*]	
ORC	Common Order	R	[1..1]	4
[{TQ1}]	Timing/Quantity	RE	[0..1]	4
[OBR]	Observation Request	R	[1..1]	4
}]	--- ORDER end			

}	--- SPECIMEN end			

Notes HL7 V2.5 Chapter 4 describe SPM and SAC under OBR segment. But, we cannot find out the necessity of them.

Field MSH-9 – Message Type shall have its three components valued as follows: ORL^O34^ORL_O34

Please refer to the section 7.5.1 (OML^O21) and ORL^O22), for a detailed description of the segments composing the above messages.

7.5.3 Laboratory Order for Multiple Orders related to a Single Container of a Specimen (OML^O35, ORL^O36)

7.5.3.1 Trigger Events

OML (O35): Work order sent by the Order Filler.

ORL (O36): Acknowledgement of the Work Order sent by the Automation Manager.

The trigger event for this message is any change to a laboratory order. Such changes include submission of new orders, cancellations, updates, etc where multiple orders are associated with a single container of a specimen.

Notes HL7 V2.5 Chapter 4 describes "The trigger event for this message is any change to a laboratory order. Such changes include submission of new orders, cancellations, updates, etc where multiple orders are associated with a single sample which may be carried in a multiple container". This is same as OML^O33, and it seems a miss of typing.

7.5.3.2 Message Semantics

Refer to the HL7 standard for the OML message of HL7 2.5 Chapter 4 and the general message semantics.

In addition, when the Order Filler sends a new work order to the Automation Manager, ORC-1 "Order Control Code" is valued with "NW". When the work order is canceled, ORC-1 is valued with "CA". The correction of the work order uses value "RP".

The OBX segments are used to convey the patient's previous results, as well as some observation provided by the Order Placer or by the Order Filler, such as: blood pressure, patient's temperature, specimen collection volume…

Table 7.5-5 : OML^O35

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
[	--- PATIENT begin	O	[0..1]	
PID	Patient identification	R	[1..1]	3
[PV1]	Patient visit	RE	[0..1]	3
]	--- PATIENT end			
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen	R	[1..1]	7
{	--- CONTAINER begin	R	[1..*]	
SAC	Specimen Container	R	[1..1]	13
{	--- ORDER begin	R	[1..*]	

ORC	Common order	R	[1..1]	4
[{TQ1}]	Timing/Quantity Order Sequence	RE	[0..1]	4
[	--- OBSERVATION REQUEST begin	O	[0..1]	
OBR	Observation Request	R	[1..1]	4
[TCD]	Test Code Details	O	[0..1]	13
[{OBX}]	Additional specimen characteristics	O	[0..*]	7
{	--- PRIOR RESULT start	O	[0..*]	
[ORC]	Common order – prrior result	O	[0..1]	4
OBR	Order detail – prior result	R	[1..1]	4
{OBX}	Observation/Result - prior result	R	[1..*]	7
}	--- PRIOR RESULT end			
]	--- OBSERVATION REQUEST end			
}	--- ORDER end			
}	--- CONTAINER end			
}	--- SPECIMEN end			

Field MSH-9 – Message Type shall have its three components valued as follows: OML^O35^OML_O35

Table 7.5-6 : ORL^O36

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R		2
MSA	Message Acknowledgement	R		2
[{ERR}]	Error	O		2
[PID]	Patient Identification	O	[0..1]	3
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen	R	[1..1]	7
{	--- CONTAINER begin	R	[1..*]	
SAC	Specimen Container	R	[1..1]	13
[{	--- ORDER begin	O	[0..*]	
ORC	Common Order	R	[1..1]	4
[{TQ1}]	Timing/Quantity	RE	[0..1]	4
[OBR]	Observation Request	R		4
}]	--- ORDER end			
}	--- CONTAINER end			
]	--- SPECIMEN END			

1730 Field MSH-9 – Message Type shall have its three components valued as follows: ORL^O36^ORL_O36

7.5.3.2.1 OBR segment

All fields are optional except those listed in table below.

Table 7.5-7 : OBR Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	4	SI	O	[0..1]		00237	Set ID – OBR
2	22	EI	R	[1..1]		00216	Placer Order Number
3	22	EI	RE	[0..1]		00217	Filler Order Number
4	250	CE	R	[1..1]		00238	Universal Service Identifier
5	2	ID	X	[0..0]		00239	Priority – OBR
6	26	TS	X	[0..0]		00240	Requested Date/Time
7	26	TS	X	[0..0]		00241	Observation Date/Time #
8	26	TS	X	[0..0]		00242	Observation End Date/Time #
9	20	CQ	X	[0..0]		00243	Collection Volume *
10	250	XCN	O	[0..*]		00244	Collector Identifier *
11	1	ID	RE	[0..1]	0065	00245	Specimen Action Code *
12	250	CE	X	[0..0]		00246	Danger Code
13	300	ST	X	[0..0]		00247	Relevant Clinical Information
14	26	TS	X	[0..0]		00248	Specimen Received Date/Time *
15	300	SPS	X	[0..0]		00249	Specimen Source
16	250	XCN	R	[1..1]		00226	Ordering Provider
17	250	XTN	RE	[0..2]		00250	Order Callback Phone Number
18	60	ST	X	[0..0]		00251	Placer Field 1
19	60	ST	X	[0..0]		00252	Placer Field 2
20	60	ST	X	[0..0]		00253	Filler Field 1 +
21	60	ST	X	[0..0]		00254	Filler Field 2 +
22	26	TS	X	[0..0]		00255	Results Rpt/Status Chng - Date/Time +
23	40	MOC	X	[0..0]		00256	Charge to Practice +
24	10	ID	C	[0..1]	0074	00257	Diagnostic Serv Sect ID
25	1	ID	X	[0..0]	0123	00258	Result Status +
26	400	PRL	X	[0..0]		00259	Parent Result +
27	200	TQ	X	[0..0]		00221	Quantity/Timing
28	250	XCN	O	[0..*]		00260	Result Copies To
29	200	EIP	X	[0..0]		00261	Parent
30	20	ID	X	[0..0]	0124	00262	Transportation Mode
31	250	CE	O	[0..1]		00263	Reason for Study
32	200	NDL	O	[0..1]		00264	Principal Result Interpreter +
33	200	NDL	O	[0..1]		00265	Assistant Result Interpreter +
34	200	NDL	O	[0..1]		00266	Technician +
35	200	NDL	O	[0..1]		00267	Transcriptionist +
36	26	TS	O	[0..1]		00268	Scheduled Date/Time +
37	4	NM	O	[0..1]		01028	Number of Sample Containers *
38	250	CE	O	[0..1]		01029	Transport Logistics of Collected Sample *
39	250	CE	O	[0..1]		01030	Collector's Comment *
40	250	CE	X	[0..0]		01031	Transport Arrangement Responsibility
41	30	ID	X	[0..0]	0224	01032	Transport Arranged
42	1	ID	X	[0..0]	0225	01033	Escort Required
43	250	CE	X	[0..0]		01034	Planned Patient Transport Comment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
44	250	CE	O	[0..1]	0088	00393	Procedure Code
45	250	CWE	O	[0..1]	0340	01316	Procedure Code Modifier
46	250	CE	O	[0..1]	0411	01474	Placer Supplemental Service Information
47	250	CE	O	[0..1]	0411	01475	Filler Supplemental Service Information
48	250	CWE	X	[0..0]	0476	01646	Medically Necessary Duplicate Procedure Reason.
49	2	IS	O	[0..1]	0507	01647	Result Handling

OBR-2 Placer Order Number shall be reflected in a test result (LAB-5:OUL message), and it is used to in order that Order Filler or Order Placer use it to pull out the corresponding order record.

OBR-3 If Filler Order Number present, it should be filled in.

7.5.3.2.2 TCD segment

All fields are optional except those listed in table below.

Table 7.5-8 : TCD Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	250	CE	R	[1..1]		00238	Universal Service Identifier
2	20	SN	O	[0..1]		01420	Auto-Dilution Factor
3	20	SN	O	[0..1]		01421	Rerun Dilution Factor
4	20	SN	O	[0..1]		01422	Pre-Dilution Factor
5	20	SN	O	[0..1]		01413	Endogenous Content of Pre-Dilution Diluent
6	1	ID	O	[0..1]	0136	01416	Automatic Repeat Allowed
7	1	ID	O	[0..1]	0136	01424	Reflex Allowed
8	250	CE	O	[0..1]	0389	01425	Analyte Repeat Status

7.5.3.3 Expected Action

If the OML message of the Order Control Code NW is received from Order Filler, the Automation Manager will receive and register the order information, then it will transmit the result either “Accept” or “Reject” to Order Filler by the ORL message.

If the OML message of the Order Control Code CA is received from Order Filler, Automation Manager will cancel the existing previous order information, and will not try to schedule or execute the command. Moreover, the command that has already started at the Automation Manager is not canceled. The result either Accept or Reject is transmitted to Order Filler by the ORL message.

Automation Manager will change and register record of the command, if the OML message of the Order Control Code RP is received from Order Filler. However, Automation Manager does not change the command that has already started. The result either Accept or Reject is transmitted to Order Filler by the ORL message.

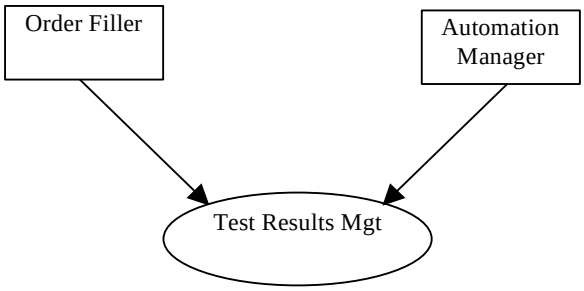
8 Transaction LAB-5: Test Results Management

This section corresponds to transaction LAB-5 of IHE Laboratory Technical Framework. The actors using this transaction are the Order Filler and the Automation Manager.

8.1 Scope

This transaction is used when Automation Manager transmits test results to Order Filler.

8.2 Use case roles



Actor: Order Filler

Role: The Order Filler manages the test results notified by the Automation Manager.

Actor: Automation Manager

Role: Handles the preprocessing and the analysis processing to fulfill the Work Order, performs the technical validation and sends the results technically validated to the Order Filler.

8.3 Referenced standards

HL7 Version 2.5--mainly referred to in Chapter 7.

8.4 Interaction diagrams

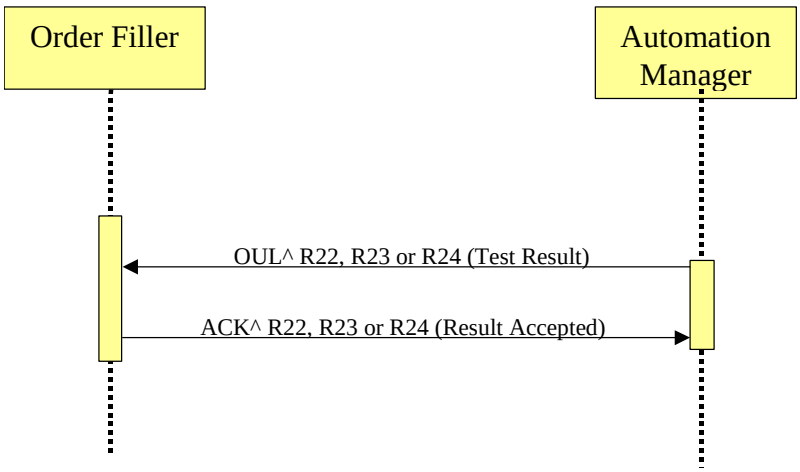


Figure 8.4-1: Unsolicited Observation Message from Automation Manager

8.5 Messages static definitions

8.5.1 Trigger Events

OUL (R22 or R23 or R24) : Automation Manager transmits test results.

The use of R22 is recommended when transferring multiple results related to a specimen from a patient.

The use of R23 is recommended when transferring multiple results related to one or more specific containers with one or more specimens from a patient.

The use of R24 is recommended, when transferring multiple results, each one related to none, one or more specific containers with one or more specimens from a patient.

ACK (R22 or R23 or R24): Order Filler response acknowledgements.

Notes HL7 V2.5 Chapter 7 has no description of ACK message. However, ACK message is necessary to exchange the messages on the HL7.

8.5.1.1 Message semantics (R22)

Refer to the HL7 standard for the OUL message of HL7 2.5 Chapter 7 and the general message semantics.

Table 8.5-1 OUL^R22

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
[PID]	Patient Identification	RE	[0..1]	3
[PV1]	Patient Visit	O	[0..1]	3
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen information	R	[1..1]	7
[{ OBX }]	Observation Result (for Specimen)	O	[0..*]	7
[{	--- CONTAINER begin	0	[0..*]	
SAC	Container information	R	[1..1]	13
[INV]	Detailed Substance information (e.g., id, lot, manufacturer, … of QC specimen)	O	[0..1]	13
}]	--- CONTAINER end			
{	--- ORDER begin	R	[1..*]	
OBR	Observation Order	R	[1..1]	7
[ORC]	Common Order	O	[0..1]	4
[{	--- RESULT begin	O	[0..*]	
OBX	Observation Result	R	[1..1]	7
[TCD]	Test Code Detail	O	[0..1]	13
[{SID}]	Substance Identifier (e.g., reagents used for testing)	O	[0..*]	13
[{NTE}]	Notes and comments	O	[0..*]	
}]	--- RESULT end			
}	--- ORDER end			
}	--- SPECIMEN end			

The carrier information in the case of notifying the test results of a patient's sample uses SAC.

Table 8.5-2 ACK^R22

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
MSA	Message Acknowledgement	R	[1..1]	2
[ERR]	Error	O	[0..1]	2

Field MSH-9 – Message Type shall have its three components valued as follows: OUL^R22^OUL_R22

8.5.1.2 Message semantics (R23)

Refer to the HL7 standard for the OUL message of HL7 2.4 or 2.5 Chapter 7 and the general message semantics.

Table 8.5-3: OUL^R23

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
[PID]	Patient Identification	RE	[0..1]	3
[PV1]	Patient Visit	O	[0..1]	3
{	--- SPECIMEN begin	R	[1..*]	
SPM	Specimen information	R	[1..1]	7
[{ OBX }]	Observation Result (for Specimen)	O	[0..*]	7
{	--- CONTAINER begin	R	[1..*]	
SAC	Container information	R	[1..1]	13
[INV]	Detailed Substance information (e.g., id, lot, manufacturer, … of QC specimen)	O	[0..1]	13
{	--- ORDER begin	R	[1..*]	
OBR	Observation Order	R	[1..1]	7
[ORC]	Common Order	O	[0..1]	4
[{	--- RESULT begin	O	[0..*]	
OBX	Observation Result	R	[1..1]	7
[TCD]	Test Code Detail	O	[0..1]	13
[{SID}]	Substance Identifier (e.g., reagents used for testing)	O	[0..*]	13
[{NTE}]	Notes and comments	O	[0..*]	
}]	--- RESULT end			
}	--- ORDER end			
}	--- CONTAINER end			
}	--- SPECIMEN end			

Field MSH-9 – Message Type shall have its three components valued as follows: OUL^R23^OUL_R23

The carrier information in the case of notifying the test results of a patient's sample uses SAC.

Refer to HL7 Chapter 13 for INV, SID segments and refer to HL7 Chapter 7 for CTI segment.

Table 8.5-4 ACK^R23

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
MSA	Message Acknowledgement	R	[1..1]	2
[ERR]	Error	O	[0..1]	2

Field MSH-9 - Message Type (MSG) shall have its two first components respectively valued to "OUL" and "R23".

Note: The message structure of R23 (SPM { SAC { OBX }}) seems to be closed to the present use.

8.5.1.3 Message semantics (R24)

1820 Refer to the HL7 standard for the OUL message of HL7 2.5 Chapter 7 and the general message semantics.

Table 8.5-5: OUL^R24

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
[PID]	Patient Identification	RE	[0..1]	3
[PV1]	Patient Visit	O	[0..1]	3
{	--- ORDER begin	R	[1..*]	
OBR	Observation Order	R	[1..1]	7
[ORC]	Common Order	O	[0..1]	4
[{TQ1}]	Timing/Quantity	RE	[0..1]	4
[{	--- SPECIMEN begin	O	[0..*]	
SPM	Specimen information	R	[1..1]	7
[{ OBX }]	Observation Result (for Specimen)	O	[0..*]	7
[{	--- CONTAINER begin	O	[0..*]	
SAC	Container information	R	[1..1]	13
[INV]	Detailed Substance information (e.g., id, lot, manufacturer, … of QC specimen)	O	[0..1]	13
}]	--- CONTAINER end			
}]	--- SPECIMEN end			
[{	--- RESULT begin	O	[0..*]	
OBX	Observation Result	R	[1..1]	7
[TCD]	Test Code Detail	O	[0..1]	13
[{SID}]	Substance Identifier (e.g., reagents used for testing)	O	[0..*]	13
[{NTE}]	Notes and comments	O	[0..*]	
}]	--- RESULT end			
}	--- ORDER end			

Field MSH-9 – Message Type shall have its three components valued as follows: OUL^R24^OUL_R24

The carrier information in the case of notifying the test results of a patient's sample uses SAC.

Table 8.5-6: ACK^R24

Segment	Meaning	Usage	Card.	HL7 chapter
MSH	Message header	R	[1..1]	2
MSA	Message Acknowledgement	R	[1..1]	2
[ERR]	Error	O	[0..1]	2

Field MSH-9 - Message Type (MSG) shall have its two first components respectively valued to "OUL" and "R24".

Refer to HL7 Chapter 13 for INV, SID segments and refer to HL7 Chapter 7 for CTI segment.

8.5.1.4 Expected Action

Automation Manager notifies test results with the OUL message to Order Filler. The Order Filler accepts and registers information, and responds to the Automation Manager with the ACK message.

8.5.1.5 OBR segment

All fields are optional except those listed in table below.

Table 8.5-7: OBR segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	4	SI	O	[0..1]		00237	Set ID – OBR
2	22	EI	R	[1..1]		00216	Placer Order Number
3	22	EI	RE	[0..1]		00217	Filler Order Number
4	250	CE	R	[1..1]		00238	Universal Service Identifier
5	2	ID	X	[0..0]		00239	Priority – OBR
6	26	TS	X	[0..0]		00240	Requested Date/Time
7	26	TS	RE	[0..1]		00241	Observation Date/Time #
8	26	TS	RE	[0..1]		00242	Observation End Date/Time #
9	20	CQ	O	[0..1]		00243	Collection Volume *
10	250	XCN	O	[0..*]		00244	Collector Identifier *
11	1	ID	RE	[0..1]	0065	00245	Specimen Action Code *
12	250	CE	X	[0..0]		00246	Danger Code
13	300	ST	X	[0..0]		00247	Relevant Clinical Information
14	26	TS	X	[0..0]		00248	Specimen Received Date/Time *
15	300	SPS	X	[0..0]		00249	Specimen Source
16	250	XCN	R	[1..1]		00226	Ordering Provider
17	250	XTN	RE	[0..2]		00250	Order Callback Phone Number
18	60	ST	X	[0..0]		00251	Placer Field 1

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
19	60	ST	X	[0..0]		00252	Placer Field 2
20	60	ST	X	[0..0]		00253	Filler Field 1 +
21	60	ST	X	[0..0]		00254	Filler Field 2 +
22	26	TS	C	[0..1]		00255	Results Rpt/Status Chng - Date/Time +
23	40	MOC	X	[0..0]		00256	Charge to Practice +
24	10	ID	C	[0..1]	0074	00257	Diagnostic Serv Sect ID
25	1	ID	R	[1..1]	0123	00258	Result Status +
26	400	PRL	O	[0..1]		00259	Parent Result +
27	200	TQ	X	[0..0]		00221	Quantity/Timing
28	250	XCN	O	[0..*]		00260	Result Copies To
29	200	EIP	O	[0..1]		00261	Parent
30	20	ID	X	[0..0]	0124	00262	Transportation Mode
31	250	CE	O	[0..1]		00263	Reason for Study
32	200	NDL	O	[0..1]		00264	Principal Result Interpreter +
33	200	NDL	O	[0..1]		00265	Assistant Result Interpreter +
34	200	NDL	O	[0..1]		00266	Technician +
35	200	NDL	O	[0..1]		00267	Transcriptionist +
36	26	TS	O	[0..1]		00268	Scheduled Date/Time +
37	4	NM	O	[0..1]		01028	Number of Sample Containers *
38	250	CE	O	[0..1]		01029	Transport Logistics of Collected Sample *
39	250	CE	O	[0..1]		01030	Collector's Comment *
40	250	CE	X	[0..0]		01031	Transport Arrangement Responsibility
41	30	ID	X	[0..0]	0224	01032	Transport Arranged
42	1	ID	X	[0..0]	0225	01033	Escort Required
43	250	CE	X	[0..0]		01034	Planned Patient Transport Comment
44	250	CE	O	[0..1]	0088	00393	Procedure Code
45	250	CWE	O	[0..1]	0340	01316	Procedure Code Modifier
46	250	CE	O	[0..1]	0411	01474	Placer Supplemental Service Information
47	250	CE	O	[0..1]	0411	01475	Filler Supplemental Service Information
48	250	CWE	X	[0..0]	0476	01646	Medically Necessary Duplicate Procedure Reason.
49	2	IS	O	[0..1]	0507	01647	Result Handling

All field data should reflect LAB-4 transaction's OBR.

8.5.1.6 TCD segment

All fields are optional except those listed in table below.

Table 8.5-8 : TCD segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	250	CE	R	[1..1]		00238	Universal Service Identifier

9 Real world use cases

9.1 Guidelines

Each of the real world use cases in this section are to be considered as a template for handling a category of laboratory testing throughout all the transactions of the Laboratory Technical Framework. Only the major steps and interactions are described.

Each use case is described by a storyboard that describes the complete workflow in chronological order, completed by an interaction diagram, and illustrated by the most significant messages of this workflow.

The message descriptions are abbreviated, to focus on the main points of interest.

For brevity, only some of the application acknowledgements are shown.

The actors' names are abbreviated with their initials (OP, OF, AM, ORT). These abbreviations are also used in the MSH-3 (sending application) and MSH-5 (receiving application) fields.

All use cases assume that the placer order is related to a placer group number (ORC-4).

All tests are identified in OBX segments by their LOINC code when available.

Colors point out key information in the messages.

9.2 Two Hematology batteries on a blood specimen

9.2.1 Storyboard

This example corresponds to the use case described in Volume 1 as "Externally placed order with specimens unidentified or to be collected by the laboratory". The specimen is not identified by the ordering care unit.

Dr Physician orders two batteries of tests on the same specimen: blood count and differential blood count.

Human actors and organizations participating to the process:

Assigning authority: Abbeville Hospital
Placer: Urology department.
Filler: Cytology laboratory.
Ordering facility: Urology.
Patient: John Ill, Patient hospital identifier: 6543210, Patient visit number: 999888, class = inpatient
Orderer: Dr Uro.
Placer order enterer: Janet Nurse.
Specimen collector: John Collect.
Technician: Marc Techos.
Clinical expert: Jane Cyto.

ID numbers used by the workflow:

ID number	Value	Assigned by
Patient hospital ID	6543210	Admission office (ADT)
Patient visit number	9998888	Admission office (ADT)
Care unit order group	555	Urology department (OP)
Care unit order (1st battery)	9876543	Urology department (OP)
Care unit order (2nd battery)	9876544	Urology department (OP)
Laboratory order (1st battery) idem for work order	456	Cytology laboratory (OF)
Laboratory order (2nd battery) idem for work order	457	Cytology laboratory (OF)
Specimen	456_1	Cytology laboratory (OF)

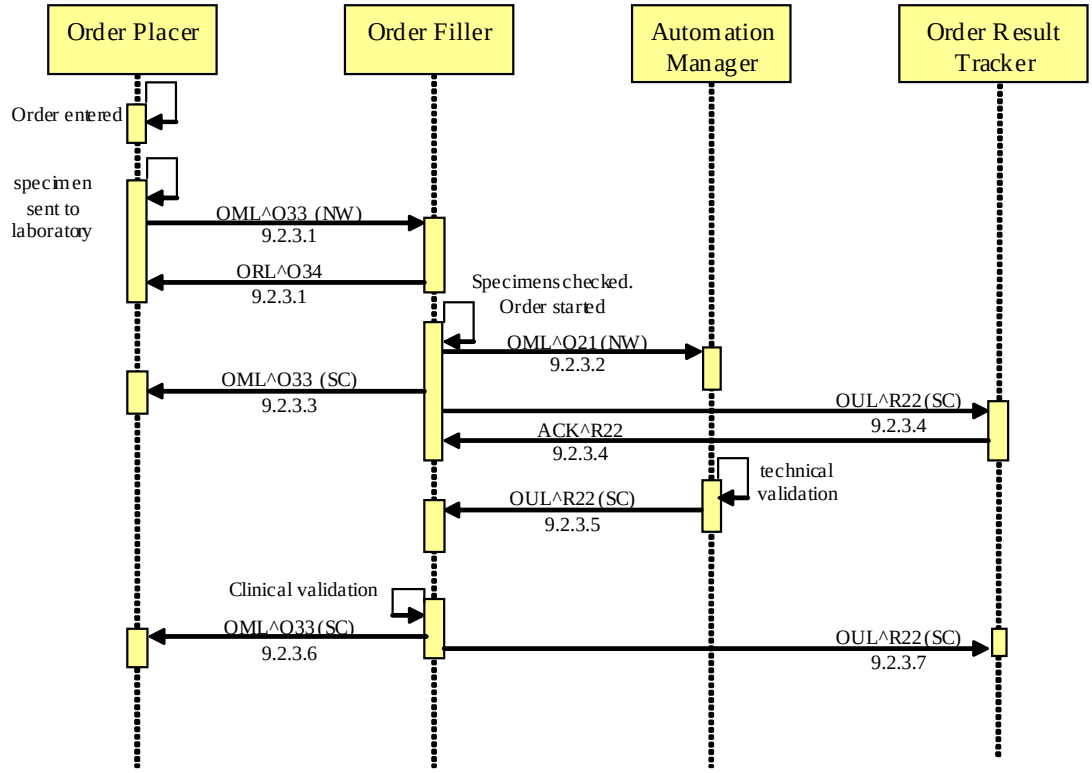
LAB-1 interaction: The Care Unit collects a specimen related to an order for a blood count and a differential count, and sends the specimen to the chemistry laboratory. The Order Placer sends a message "new order" (NW) accompanying the specimen, to let the laboratory start the testing.

LAB-4, LAB-1 and LAB-3 interactions: The laboratory checks the specimen and schedules the work. An identifier is assigned to the specimen by the Order Filler and the corresponding identification label is printed out. The Order Filler sends a unique work order to the Automation Manager. The Order Filler notifies both Order Placer and Order Result Tracker of the scheduled work.

LAB-5, LAB-1 and LAB-3 interactions: After technical validation by a laboratory technician (Marc Techos), the Automation Manager sends back all the observations to the Order Filler.

LAB-1 and LAB-3 interactions: After clinical validation, the Order Filler notifies the results to the Order Result Tracker, and notifies the status change to the Order Placer.

9.2.2 Interaction diagram



9.2.3 Messages

9.2.3.1 LAB-1 (OP → OF): Message "New order" with one specimen

A new placer order sent to the Order Filler:

```
MSH|^~\&|OP|Urology|OF|Cytology|200310060820||OML^O33^OML_O33|001|T|2.5|||||USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||9998888
SPM|1|||BLD|||||||P||||||200310060735||||||||1
ORC|NW|9876543^Urology||555^Urology
|||||200310060710|^NURSE^JANET||||||||||Urology^^^^^^FI^^^UR01
TQ1|1|||||||R
OBR|1|9876543^Urology||85027^Hemogram and platelet count, automated^CPT4|
|||||^COLLECT^JOHN||||||^URO^^^^DR
ORC|NW|9876544^Urology||555^Urology
|||||200310060710|^NURSE^JANET||||||||||Urology^^^^^^FI^^^UR01
TQ1|1|||||||R
OBR|1|9876544^Urology||85009^Differential WBC Count, buffy coat^CPT4|
|||||^COLLECT^JOHN||||||^URO^^^^DR
```

The related acknowledgement message isn't shown.

9.2.3.2 LAB-4 (OF → AM): Message "New order"

A new work order is sent to the Automation Manager:

```
MSH|^~\&|OF|Cytology|AM|Automation|200310060825||OML^O33^OML_O33|101|T|2.5|||||USA|
|EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||9998888
SPM|1|456_1^Cytology||BLD|||||||P||||||200310060735|200310060821|||||||1
ORC|NW|||555^Urology|||||200310060710|^NURSE^JANET||||||||||Urology^^^^^^FI^^^UR01
TQ1|1|||||||R
OBR|1|456^Cytology||85027^Hemogram and platelet count, automated^CPT4|
|||||^COLLECT^JOHN||||||^URO^^^^DR
ORC|NW|||555^Urology|||||200310060710|^NURSE^JANET||||||||||Urology^^^^^^FI^^^UR01
TQ1|1|||||||R
OBR|1|457^Cytology||85009^Differential WBC Count, buffy coat^CPT4|
|||||^COLLECT^JOHN||||||^URO^^^^DR
```

Acknowledgement sent by the Automation Manager:

```
MSH|^~\&|AM|Automation|OF|Cytology|200310060826||ORL^O34^ORL_O34|301|T|2.5|||||USA|
EN
MSA|AA|101
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
SPM|1|456_1^Cytology||BLD|||||||P||||||200310060735|200310060821|||||||1
ORC|OK|||555^Urology|SC||||200310060710|^NURSE^JANET||||||||||
Urology^^^^^^FI^^^UR01
TQ1|1|||||||R
OBR|1|456^Cytology||85027^Hemogram and platelet count, automated^CPT4|
|||||^COLLECT^JOHN|S|||||^URO^^^^DR
ORC|OK|||555^Urology|SC||||200310060710|^NURSE^JANET||||||||||
Urology^^^^^^FI^^^UR01
TQ1|1|||||||R
OBR|1|457^Cytology||85009^Differential WBC Count, buffy coat^CPT4|
|||||^COLLECT^JOHN|S|||||^URO^^^^DR
```

9.2.3.3 LAB-1 (OF → OP): Message "Status changed"

The placer order has been assigned a filler order number, the specimen is available and identified by the laboratory:

```
MSH|^~\&|OF|Cytology|OP|Urology|200310060825||OML^O33^OML_O33|108|T|2.5|||||USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||9998888
SPM|1|456_1^Cytology||BLD|||||||P||||||200310060735|200310060821||Y||||||1
ORC|SC|9876543^Urology||555^Urology|IP||||200310060710|^NURSE^JANET||||||||||
Urology^^^^^^FI^^^UR01
TQ1|1|||||||R
OBR|1|9876543^Urology|456^Cytology|85027^Hemogram and platelet count,
automated^CPT4|
|||||^COLLECT^JOHN|P|||||^URO^^^^DR|||||||||I
ORC|SC|9876544^Urology||555^Urology|IP||||200310060710|^NURSE^JANET||||||||||
Urology^^^^^^FI^^^UR01
TQ1|1|||||||R
OBR|1|9876544^Urology|457^Cytology|85009^Differential WBC Count, buffy coat^CPT4|
|||||^COLLECT^JOHN|P|||||^URO^^^^DR|||||||||I
```

The related acknowledgement message isn't shown.

9.2.3.4 LAB-3 (OF->ORT): Message "New Order"

The Order Result Tracker is notified of the creation of the filler order by means of a result message:

```
MSH|^~\&|OF|Cytology|ORT||200310060825||OUL^R22^OUL_R22|122|T|2.5|||||USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||9998888
SPM|1|456_1^Cytology|||BLD|||||||P||||||200310060735|200310060821||Y||||||1
OBR|1|9876543^Urology|456^Cytology|85027^Hemogram and platelet count,
automated^CPT4|
|||||^COLLECT^JOHN|P|||||^URO^^^^DR|||||||||I
ORC|SC|9876543^Urology|||555^Urology|IP||||200310060710|^NURSE^JANET||||||||||||
Urology^^^^^^FI^^^UR01
TQ1|1|||||||||R
OBR|2|9876544^Urology|457^Cytology|85009^Differential WBC Count, buffy coat^CPT4|
|||||^COLLECT^JOHN|P|||||^URO^^^^DR|||||||||I
ORC|SC|9876544^Urology|||555^Urology|IP||||200310060710|^NURSE^JANET||||||||||||
Urology^^^^^^FI^^^UR01
TQ1|1|||||||||R
```

Acknowledgement sent by the Order Results Tracker:

```
MSH|^~\&|ORT||OF|Cytology|200310060826||ACK^R22^ACK_R22|401|T|2.5|||||USA|EN
MSA|AA|122
```

9.2.3.5 LAB-5 (AM->OF): Message "New Results"

The Automation Manager sends the final results for the work order:

```
MSH|^~\&|AM|Automation|OF|Urology|200310060900||OUL^R22^OUL_R22|308|T|2.5|||||USA||
EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||9998888
SPM|1|456_1^Cytology|||BLD|||||||P||||||200310060735|200310060821||Y||||||1
OBR|1|456^Cytology|||85027^Hemogram and platelet count, automated^CPT4|
|||||^COLLECT^JOHN|P|||||^URO^^^^DR|
||||||200310060832|||F|||||||&TECHOS&MARC^200310060833
ORC|SC||||CM||||200310060710|^NURSE^JANET||||||||||||Urology^^^^^^FI^^^UR01
OBX|1|NM|11156-7^LEUKOCYTES^LN||8.2|10*3/mm3|4-10|N|||F|||200310060830
OBX|2|NM|11273-0^ERYTHROCYTES^LN||4.08|10*6/mm3|10-12|N|||F|||200310060830
OBX|3|NM|20509-6^HEMOGLOBIN^LN||13.4|g/dL|11.5-14.5|N|||F|||200310060830
OBX|4|NM|20570-8^HEMATOCRIT^LN||39.7|%|37-47|N|||F|||200310060830
OBX|5|NM|30428-7^MCV^LN||97|fL|80-95|N|||F|||200310060830
OBX|6|NM|28539-5^MCH^LN||33.0|pg|27-32|N|||F|||200310060830
OBX|7|NM|28540-3^MCHC^LN||33.8|%|30-36|N|||F|||200310060830
OBX|8|NM|11125-2^PLATELETS^LN||220|10*9/L|150-400|N|||F|||200310060830
OBR|2|457^Cytology|||85009^Differential WBC Count, buffy coat^CPT4|
|||||^COLLECT^JOHN|P|||||^URO^^^^DR
||||||200310060832|||F|||||||&TECHOS&MARC^200310060833
ORC|SC||||CM||||200310060710|^NURSE^JANET||||||||||||Urology^^^^^^FI^^^UR01
OBX|1|NM|23761-0^NEUTROPHILS/100 LEUKOCYTES^LN||72|%||N|||F|||200310060830
OBX|2|NM|26450-7^EOSINOPHILS/100 LEUKOCYTES^LN||2|%||N|||F|||200310060830
OBX|3|NM|26478-8^LYMPHOCYTES/100 LEUKOCYTES^LN||20|%||N|||F|||200310060830
OBX|4|NM|26485-3^MONOCYTES/100 LEUKOCYTES^LN||6|%||N|||F|||200310060830
OBX|5|NM|30180-4^BASOPHILS/100 LEUKOCYTES^LN||0|%||N|||F|||200310060830
```

The related acknowledgement message isn't shown.

9.2.3.6 LAB-1 (OF->OP): Message "Status Changed"

The clinical expert has performed the clinical validation at 09h29. The order is completed:

```
MSH|^~\&|OF|Urology| OP|Urology|200310060930||OML^O33^OML_O33|181|T|2.5|||||USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
```



```
PV1|1|I|||||||||||||||9998888
SPM|1|456_1^Cytology||BLD|||||||P||||||200310060735|200310060821||Y||||||1
ORC|SC|9876543^Urology||555^Urology|CM||||200310060710|^NURSE^JANET||||||||||
Urology^^^^^^FI^^^UR01
TQ1|1|||||||R
OBR|1|9876543^Urology|456^Cytology|85027^Hemogram and platelet count,
automated^CPT4|
|||||^COLLECT^JOHN|P|||||^URO^^^^DR|||||||||F|||||||&CYTO&JANE^200310060929
ORC|SC|9876544^Urology||555^Urology|CM||||200310060710|^NURSE^JANET||||||||||
Urology^^^^^^FI^^^UR01
TQ1|1|||||||R
OBR|1|9876544^Urology|457^Cytology|85009^Differential WBC Count, buffy coat^CPT4|
|||||^COLLECT^JOHN|P|||||^URO^^^^DR|||||||||F|||||||&CYTO&JANE^200310060929
```

The related acknowledgement message isn't shown.

9.2.3.7 LAB-3 (OF->ORT): Message "Status Changed"

The clinical expert has performed the clinical validation at 09h29. The order is completed. The results are final:

```
MSH|^~\&|OF|Cytology|ORT||200310060931||OUL^R22^OUL_R22|182|T|2.5|||||USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||9998888
SPM|1|456_1^Cytology||BLD|||||||P||||||200310060735|200310060821||Y||||||1
OBR|1|9876543^Urology|456^Cytology|85027^Hemogram and platelet count,
automated^CPT4|
|||||^COLLECT^JOHN|P|||||^URO^^^^DR|
||||||200310060929|||F|||||||&CYTO&JANE^200310060929
ORC|SC|9876543^Urology||555^Urology|CM||||200310060710|^NURSE^JANET||||||||||
Urology^^^^^^FI^^^UR01
TQ1|1|||||||R
OBX|1|NM|11156-7^LEUKOCYTES^LN||8.2|10*3/mm3|4-10|N|||F|||200310060830
OBX|2|NM|11273-0^ERYTHROCYTES^LN||4.08|10*6/mm3|10-12|N|||F|||200310060830
OBX|3|NM|20509-6^HEMOGLOBIN^LN||13.4|g/dL|11.5-14.5|N|||F|||200310060830
OBX|4|NM|20570-8^HEMATOCRIT^LN||39.7|%|37-47|N|||F|||200310060830
OBX|5|NM|30428-7^MCV^LN||97|fL|80-95|N|||F|||200310060830
OBX|6|NM|28539-5^MCH^LN||33.0|pg|27-32|N|||F|||200310060830
OBX|7|NM|28540-3^MCHC^LN||33.8|%|30-36|N|||F|||200310060830
OBX|8|NM|11125-2^PLATELETS^LN||220|10*9/L|150-400|N|||F|||200310060830
OBR|2|9876544^Urology|457^Cytology|85009^Differential WBC Count, buffy coat^CPT4|
|||||^COLLECT^JOHN|P|||||^URO^^^^DR|
||||||200310060929|||F|||||||&CYTO&JANE^200310060929
ORC|SC|9876544^Urology||555^Urology|CM||||200310060710|^NURSE^JANET||||||||||
Urology^^^^^^FI^^^UR01
TQ1|1|||||||R
OBX|1|NM|23761-0^NEUTROPHILS/100 LEUKOCYTES^LN||72|%||N|||F|||200310060830
OBX|2|NM|26450-7^EOSINOPHILS/100 LEUKOCYTES^LN||2|%||N|||F|||200310060830
OBX|3|NM|26478-8^LYMPHOCYTES/100 LEUKOCYTES^LN||20|%||N|||F|||200310060830
OBX|4|NM|26485-3^MONOCYTES/100 LEUKOCYTES^LN||6|%||N|||F|||200310060830
OBX|5|NM|30180-4^BASOPHILS/100 LEUKOCYTES^LN||0|%||N|||F|||200310060830
```

The related acknowledgement message isn't shown.

9.3 Test on a series of specimens: Glucose tolerance study

9.3.1 Storyboard

This use case is in the context given by the first general use case presented in Volume 1 "3.1.1: Externally placed order with identified specimens". The ordering care unit thus identifies the specimens.

Dr Physician orders one battery and provides a series of specimen collected at different times. The battery consists of one single test: glucose concentration on blood serum, repeated on a number of specimens, to be performed by the chemistry laboratory. The order is assumed to be part of a group of placer orders identified by the placer group number '666'.

Glucose tolerance is ordered as a single battery requesting for glucose test on an unspecified number of blood serum drawn at different intervals, after initial glucose ingestion". The SPM segments in the order message indicate the number of specimens, which can vary. The result consists of all the observation performed on each related individual specimen. All specimens produce results, except one unfortunately broken.

Human actors and organizations participating to the process:

Assigning authority: Memphis Hosp.

Placer: Entero-gastric department.

Filler: Chemistry laboratory.

Ordering facility: Entero-gastric.

Patient: Adam Everyman Jr, account number: 12345 (check-digit 5 modulo 10), class = outpatient.

Orderer: Dr Physician, phone number 821, ID number in the hospital 222222.

Placer order enterer: Nancy Nurse, ID number 222221.

Specimen collector: M. Bleeder, ID number 1234.

Technician: Suzy Technician, ID number 333333.

Clinical expert: Jane Chemistry-Expert, ID number 444444.

ID numbers used by the workflow:

ID number	Value	Assigned by
Patient ID	12345	Admission office (ADT)
Care unit order	12345678	Entero-gastric department (OP)
Care unit order group	666	Entero-gastric department (OP)
1st specimen	123456781	Entero-gastric department (OP)
2nd specimen	123456782	Entero-gastric department (OP)
3rd specimen	123456783	Entero-gastric department (OP)
4th specimen	123456784	Entero-gastric department (OP)
5th specimen	123456785	Entero-gastric department (OP)
Laboratory order	555	Chemistry laboratory (OF)
1st work order	555_1	Chemistry laboratory (OF)
2nd work order	555_2	Chemistry laboratory (OF)
3rd work order	555_3	Chemistry laboratory (OF)
4th work order	555_4	Chemistry laboratory (OF)

LAB-1 interaction: The Care Unit collects the first three specimens related to an order for glucose tolerance, with the high priority 'ASAP', and sends these specimens to the chemistry laboratory. The Order Placer sends a message "new order" (NW) accompanying the first three specimens, to let the laboratory start the testing. OBR-11 "Specimen action code" is valued to "P" (pending specimen) indicating that some specimens for this order are still pending (i.e. not yet collected). The order placer provides an observation reporting the initial quantity of sugar absorbed by the patient.

LAB-4, LAB-1 and LAB-3 interactions: The laboratory checks the specimens and schedules the work. The Order Filler sends the first work orders to the Automation Manager. The Order Filler notifies both Order Placer and Order Result Tracker of the scheduled work, notifying that the third specimen being broken, won't produce any observation. SPM-20 (specimen availability) = 'N' and SPM-21 (specimen reject reason) = 'RB' (broken container). Since this is a timing series, the Order Placer won't replace this specimen. There will simply be a missing point in the final observation graph.

LAB-5, LAB-1 and LAB-3 interactions: After technical validation by , the Automation Manager sends back the first two observations to the Order Filler. Given that the order priority is "ASAP", the Order Filler notifies these partial result to the Order Result Tracker, and notifies the status change to the Order Placer, without waiting for the clinical validation.

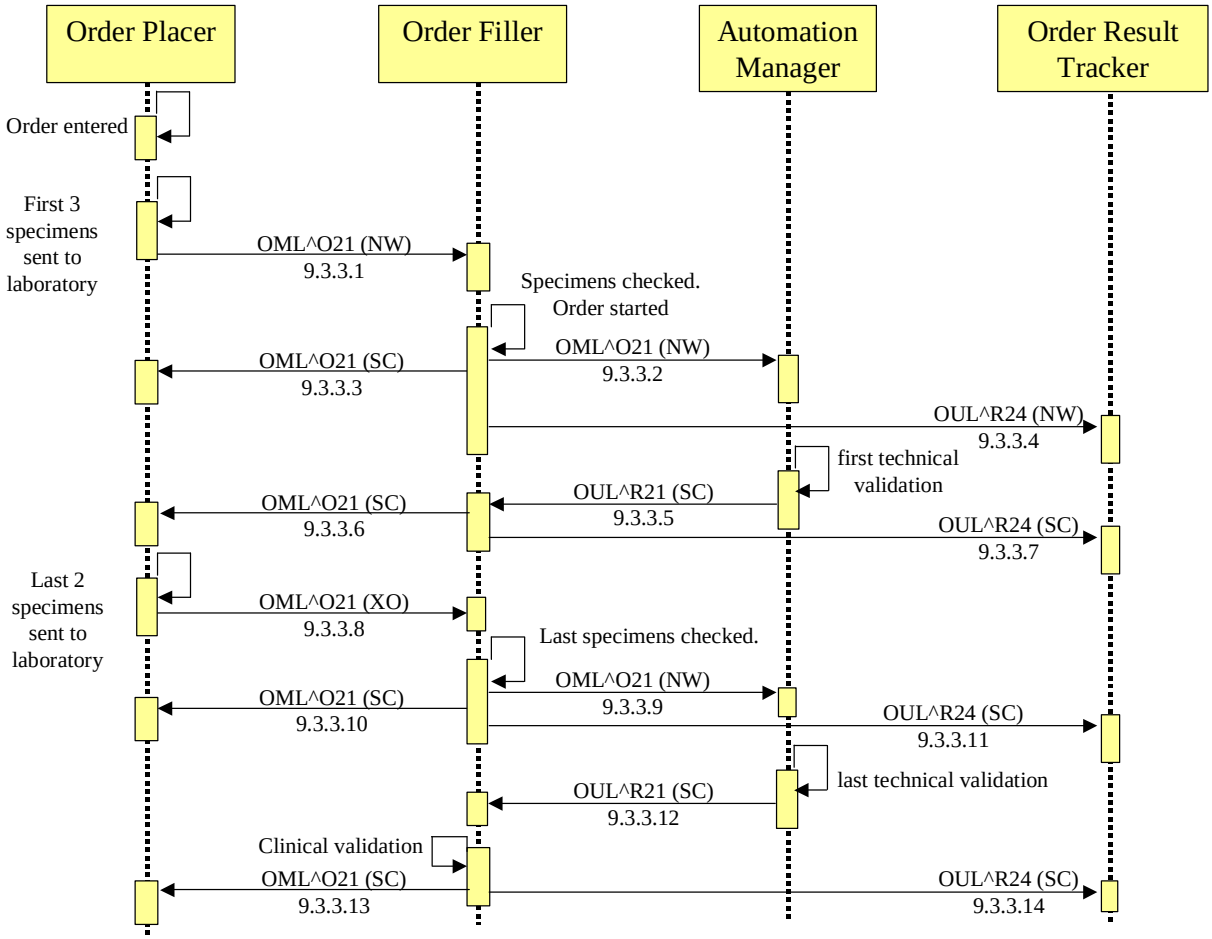
LAB-1 interaction: Later on, as the two last specimens are sent to the laboratory, the Order Placer sends an additional message for that order, with the order control "change order request" (XO). This message contains the complete list of specimens. OBR-11 "Specimen action code" is valued to "S", indicating that the specimen collection is complete, and that the laboratory can achieve its work.

LAB-4, LAB-1 and LAB-3 interactions: The laboratory checks the last specimens. The Order Filler sends the last work orders to the Automation Manager. The Order Filler notifies both Order Placer and Order Result Tracker with the progress of the order.

LAB-5 interaction: After technical validation, the Automation Manager sends the last results to the Order Filler.

LAB-1 and LAB-3 interactions: After clinical validation, the Order Filler notifies the final results to the Order Result Tracker, and notifies the status change to the Order Placer.

9.3.2 Interaction diagram



9.3.3 Messages

9.3.3.1 LAB-1 (OP → OF): Message "New order" with the first 3 specimens

A new placer order sent to the Order Filler: Priority "ASAP" for this placer order. One observation provided by the placer. Three first specimens collected. The other specimens are pending.

```
MSH|^~\&|OP|Entero-gastric|OF|Chemistry|200309060820||OML^O21^OML_O21|
msgOP123|T|2.5|123| |||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
ORC|NW|12345678^gastric||666^gastric|||||200309060710|222221^NURSE^NANCY||||||||||
Entero-gastric^^^^^^FI^^^EG02
TQ1|||||||||A
OBR||12345678^gastric||82951^Glucose Tolerance Test^CPT4||||||1234^BLEEDER|
P|||||222222^PHYSICIAN^^^^DR|821
OBX|1|NM|GLUCOSE||75|g|||||F|||200309060735
SPM|1|123456781^gastric||SER|||||||P||||||200309060735|||||||||1
SPM|2|123456782^gastric ||SER|||||||P||||||200309060755|||||||||1
SPM|3|123456783^gastric ||SER|||||||P||||||200309060815|||||||||1
```


The related acknowledgement message isn't shown.

9.3.3.2 LAB-4 (OF → AM): Message "New order" with the first 2 specimens

Two new work orders sent to the Automation Manager: Priority ASAP. One observation provided.

```
MSH|^~\&|OF|Chemistry|AM|Automation|200309060825||OML^O21^OML_O21|msgOF101|T|2.5|12
3||||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
ORC|NW|||666^gastric|||||200309060824|222221^NURSE^NANCY||||||||||
Entero-gastric^^^^^^FI^^^EG02
TQ1|||||||||A
OBR||555_1^chemistry||GLUC^GLUCOSE^L||||||1234^BLEEDER|S|||||222222^PHYSICIAN^^^^DR
|821
SPM|1|123456781^gastric ||SER|||||||P||||||200309060735|200309060821|||||||1
ORC|NW|||666^gastric|||||200309060710|222221^NURSE^NANCY||||||||||
Entero-gastric^^^^^^FI^^^EG02
TQ1|||||||||A
OBR||555_2^chemistry||GLUC^GLUCOSE^L||||||1234^BLEEDER|S|||||
222222^PHYSICIAN^^^^DR|821
SPM|1|123456782^gastric||SER|||||||P||||||200309060755|200309060821|||||||1
```

The related acknowledgement message isn't shown.

9.3.3.3 LAB-1 (OF → OP): Message "Status changed" with the first 3 specimens

The placer order has been assigned a filler order number. One specimen is rejected:

```
MSH|^~\&|OF|Chemistry|OP|Entero-gastric|200309060825||OML^O21^OML_O21|msgOF102|
T|2.5|123| |||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
ORC|SC|12345678^gastric||666^gastric |IP||||200309060824|222221^NURSE^NANCY
|||||||||| Entero-gastric^^^^^^FI^^^EG02
TQ1|||||||||A
OBR||12345678^gastric|555^chemistry|82951^Glucose Tolerance Test^CPT4||||||
1234^BLEEDER|P|||||222222^PHYSICIAN^^^^DR|821|||||||I
SPM|1|123456781^gastric ||SER|||||||P||||||200309060735|200309060821||Y||||||1
SPM|2|123456782^gastric ||SER|||||||P||||||200309060755|200309060821||Y||||||1
SPM|3|123456783^gastric ||SER|||||||P||||||200309060815|200309060821||N|RB|||||1
```

The related acknowledgement message isn't shown.

9.3.3.4 LAB-3 (OF → ORT): Message "New order" with the first 3 specimens

The Order Result Tracker is notified with the creation of the filler order: One observation is canceled.

```
MSH|^~\&|OF|Chemistry|ORT||200309060825||OUL^R24^OUL_R24|msgOF103|T|2.5|123||||USA|
|EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
OBR||12345678^gastric|555^chemistry|82951^Glucose Tolerance Test^CPT4||||||
1234^BLEEDER|P|||||222222^PHYSICIAN^^^^DR|821|||||||I
ORC|SC|12345678^gastric||666^gastric |IP||||200309060824|222221^NURSE^NANCY
||||||||||Entero-gastric^^^^^^FI^^^EG02
```



```
TQ1|||||||||A
SPM|1|123456781^gastric ||SER|||||||P||||||200309060735|200309060821||Y||||||1
SPM|2|123456782^gastric ||SER|||||||P||||||200309060755|200309060821||Y||||||1
SPM|3|123456783^gastric ||SER|||||||P||||||200309060815|200309060821||N|RB|||||1
OBX|1|NM|30264-6^GLUCOSE 40M POST DOSE GLUCOSE^LN|||||||X
OBX|1|NM|GLUCOSE||75|g|||||F|||200309060735
```

The related acknowledgement message isn't shown.

9.3.3.5 LAB-5 (AM →OF): Message "New results" for the first 2 work orders

The Automation Manager sends the two final results for the 2 work orders, technically validated by Suzy TECHNICIAN at 8h33:

```
MSH|^~\&|AM|Automation|OF|Chemistry|200309060833||OUL^R24^OUL_R24|msgAM1|T|2.5|123|
|||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
OBR||555_1^chemistry||GLUC^GLUCOSE^L||||||1234^BLEEDER
|S|||||222222^PHYSICIAN^^^^DR|821||||||200309060832|||F|||||||333333&TECHNICIAN&Suz
y^200309060833
OBX|1|NM|14749-6^GLUCOSE^LN||4200|umol/l||N|||F|||200309060830
OBR||555_2^chemistry||GLUC^GLUCOSE^L||||||1234^BLEEDER
|S|||||222222^PHYSICIAN^^^^DR|821||||||200309060832|||F|||||||333333&TECHNICIAN&Suz
y^200309060833
OBX|1|NM|14749-6^GLUCOSE^LN||6000|umol/l||N|||F|||200309060832
```

The related acknowledgement message isn't shown.

9.3.3.6 LAB-1 (OF → OP): Message "Status changed"

Some results are available, not clinically validated (i.e. not verified)

```
MSH|^~\&|OF|Chemistry|OP|Entero-gastric|200309060834||OML^O21^OML_O21|msgOF104|
T|2.5|123| |||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
ORC|SC|12345678^gastric||666^gastric|A||||200309060834|222221^NURSE^NANCY|
|||||||||Entero-gastric^^^^^FI^^^EG02
TQ1|||||||||A
OBR||12345678^gastric|555^chemistry|82951^Glucose Tolerance
Test^CPT4||||||1234^BLEEDER|P|||||222222^PHYSICIAN^^^^DR|821|||||||R
SPM|1|123456781^gastric ||SER|||||||P||||||200309060735|200309060821||Y||||||1
SPM|2|123456782^gastric ||SER|||||||P||||||200309060755|200309060821||Y||||||1
SPM|3|123456783^gastric ||SER|||||||P||||||200309060815|200309060821||N|RB|||||1
```

The related acknowledgement message isn't shown.

9.3.3.7 LAB-3 (OF → ORT): Message "Status changed"

The two first results are sent, not clinically validated (i.e. not verified):

```
MSH|^~\&|OF|Chemistry|ORT||200309060825||OUL^R24^OUL_R24|msgOF105|T|2.5|123||||USA|
|EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
OBR||12345678^gastric|^chemistry|82951^Glucose Tolerance
Test^CPT4||||||1234^BLEEDER|P|||||222222^PHYSICIAN^^^^DR|821|||||||R
ORC|SC|12345678^gastric||666^gastric|A||||200309060834|222221^NURSE^NANCY|
|||||||||Entero-gastric^^^^^FI^^^EG02
TQ1|||||||||A
SPM|1|123456781^gastric ||SER|||||||P||||||200309060735|200309060821||Y||||||1
OBX|1|NM|14996-3^GLUCOSE PRE 75 G GLUCOSE PO^LN||4200|umol/l|4000-6100|N|||
```



```
R|||200309060830
SPM|2|123456782^gastric ||SER|||||||P||||||200309060755|200309060821||Y||||||1
OBX|1|NM|30263-8^GLUCOSE 20M POST DOSE GLUCOSE^LN||6000|umol/l|<7800|N|||
R|||200309060832
SPM|3|123456783^gastric ||SER|||||||P||||||200309060815|200309060821||N|RB|||||1
OBX|1|NM|30264-6^GLUCOSE 40M POST DOSE GLUCOSE^LN|| | |||||X
OBX|1|NM|GLUCOSE||75|g|||||F|||200309060735
```

The related acknowledgement message isn't shown.

9.3.3.8 LAB-1(OP → OF): Message "Change order/service request"

The last 2 specimens have been collected and are sent to the laboratory:

```
MSH|^~\&|OP|Entero-gastric|OF|Chemistry|200309060900||OML^O21^OML_O21|msgOP124|
T|2.5|123| |||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
ORC|XO|12345678^gastric||666^gastric|||||200309060855|222221^NURSE^NANCY|
|||||||||Entero-gastric^^^^^^FI^^^EG02
TQ1|||||||||A
OBR||12345678^gastric||82951^Glucose Tolerance Test^CPT4||||||1234^BLEEDER|S|||||
222222^PHYSICIAN^^^^DR|821
OBX|1|NM|GLUCOSE||75|g|||||F|||200309060735
SPM|1|123456781^gastric ||SER|||||||P||||||200309060735|||||||||1
SPM|2|123456782^gastric ||SER|||||||P||||||200309060755|||||||||1
SPM|3|123456783^gastric ||SER|||||||P||||||200309060815|||||||||1
SPM|4|123456784^gastric ||SER|||||||P||||||200309060835|||||||||1
SPM|5|123456785^gastric ||SER|||||||P||||||200309060855|||||||||1
```

The related acknowledgement message isn't shown.

9.3.3.9 LAB-4 (OF → AM): Message "New order" with the last 2 specimens

Two new work orders sent to the Automation Manager:

```
MSH|^~\&|OF|Chemistry|AM|Automation|200309060905||OML^O21^OML_O21|msgOF106|T|2.5|12
3| |||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
ORC|NW|||666^gastric|||||200309060904|222221^NURSE^NANCY||||||||||
Entero-gastric^^^^^^FI^^^EG02
TQ1|||||||||A
OBR||555_4^chemistry ||GLUC^GLUCOSE^L||||||1234^BLEEDER|
S|||||222222^PHYSICIAN^^^^DR|821
SPM|1|123456784^gastric ||SER|||||||P||||||200309060835|200309060902|||||||1
ORC|NW|||666^gastric|||||200309060904|222221^NURSE^NANCY||||||||||
Entero-gastric^^^^^^FI^^^EG02
TQ1|||||||||A
OBR||555_5^chemistry ||GLUC^GLUCOSE^L||||||1234^BLEEDER|S|||||
222222^PHYSICIAN^^^^DR|821
SPM|1|123456785^gastric ||SER|||||||P||||||200309060855|200309060902|||||||1
```

The related acknowledgement message isn't shown.

9.3.3.10 LAB-1 (OF → OP): Message "Status changed" with all specimens

All the specimens have been checked by the laboratory staff.

```
MSH|^~\&|OF|Chemistry|OP|Entero-gastric|200309060905||OML^O21^OML_O21|msgOF107|
T|2.5|123| |||USA||EN
```



```
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
ORC|SC|12345678^gastric||666^gastric|A||||200309060904|222221^NURSE^NANCY|
|||||||||Entero-gastric^^^^^^FI^^^EG02
TQ1|||||||||A
OBR||12345678^gastric|555^chemistry|82951^Glucose Tolerance test^CPT4||||||
1234^BLEEDER|P|||||222222^PHYSICIAN^^^^DR|821|||||||R
SPM|1|123456781^gastric ||SER|||||||P|||||||200309060735|200309060821||Y|||||||1
SPM|2|123456782^gastric ||SER|||||||P|||||||200309060755|200309060821||Y|||||||1
SPM|3|123456783^gastric ||SER|||||||P|||||||200309060815|200309060821||N|RB|||||1
SPM|4|123456784^gastric ||SER|||||||P|||||||200309060835|200309060902||Y|||||||1
SPM|5|123456785^gastric ||SER|||||||P|||||||200309060855|200309060902||Y|||||||1
```

The related acknowledgement message isn't shown.

9.3.3.11 LAB-3 (OF → ORT): Message "Status changed"

The last two specimens have been received. All the work is scheduled:

```
MSH|^~\&|OF|Chemistry|ORT||200309060905||OUL^R24^OUL_R24|msgOF108|T|2.5|123||||USA|
|EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
OBR||12345678^gastric|555^chemistry|82951^Glucose Tolerance Test^CPT4||||||
1234^BLEEDER|S|||||222222^PHYSICIAN^^^^DR|821|||||||R
ORC|SC|12345678^gastric||666^gastric|A||||200309060904|222221^NURSE^NANCY|||||||||
|Entero-gastric^^^^^^FI^^^EG02
TQ1|||||||||A
SPM|1|123456781^gastric ||SER|||||||P|||||||200309060735|200309060821||Y|||||||1
OBX|1|NM|14996-3^GLUCOSE PRE 75 G GLUCOSE PO^LN||4200|umol/l|4000-6100|N|||
R|||200309060830
SPM|2|123456782^gastric ||SER|||||||P|||||||200309060755|200309060821||Y|||||||1
OBX|1|NM|30263-8^GLUCOSE 20M POST DOSE GLUCOSE^LN||6000|umol/l|<7800|N|||
R|||200309060832
SPM|3|123456783^gastric ||SER|||||||P|||||||200309060815|200309060821||N|RB|||||1
OBX|1|NM|30264-6^GLUCOSE 40M POST DOSE GLUCOSE^LN|| | |||||X
SPM|4|123456784^gastric ||SER|||||||P|||||||200309060835|200309060902||Y|||||||1
SPM|5|123456785^gastric ||SER|||||||P|||||||200309060855|200309060902||Y|||||||1
OBX|1|NM|GLUCOSE||75|g|||||F|||200309060735
```

The related acknowledgement message isn't shown.

9.3.3.12 LAB-5 (AM →OF): Message "New results" for the last 2 work orders

The Automation Manager sends the two final results for the 2 work orders, technically validated by Suzy TECHNICIAN at 9h12.

```
MSH|^~\&|AM|Automation|OF|Chemistry |200309060912||OUL^R24^OUL_R24|msgAM2|
T|2.5|123||||USA ||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
OBR||555_4^chemistry||30266-1^GLUCOSE 1.6H POST DOSE GLUCOSE^LN||||||1234^BLEEDER|
S|||||222222^PHYSICIAN^^^^DR|821||||||200309060911|||F|||||||
333333&TECHNICIAN&Suzy^200309060912
OBX|1|NM|14749-6^GLUCOSE^LN||7200|umol/l||N|||F|||200309060910
OBR||555_5^chemistry ||GLUC^GLUCOSE^L||||||1234^BLEEDER|S|||||
222222^PHYSICIAN^^^^DR|821||||||200309060911|||F|||||||333333&TECHNICIAN&Suzy^20030
9060912
OBX|1|NM|14749-6^GLUCOSE^LN||7100|umol/l||N|||F|||200309060911
```

The related acknowledgement message isn't shown.

9.3.3.13 LAB-1 (OF → OP): Message "Status changed"

Jane CHEMISTRY-EXPERT has performed the clinical validation at 9h29. The order is completed.

```
MSH|^~\&|OF|Chemistry|OP|Entero-gastric|200309060930||OML^O21^OML_O21|msgOF109|
T|2.5|123||| |USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
ORC|SC|12345678^gastric||666^gastric|CM||||200309060929|222221^NURSE^NANCY|||||||||
||Entero-gastric^^^^^^FI^^^EG02
TQ1|||||||||A
OBR||12345678^gastric|555^chemistry|82951^Glucose Tolerance Test^CPT4||||||
1234^BLEEDER|S|||||222222^PHYSICIAN^^^^DR|821||||||200309060929|||F|||||||
444444&CHEMISTRY-EXPERT&Jane^200309060929
SPM|1|123456781^gastric ||SER|||||||P||||||200309060735|200309060821||Y||||||1
SPM|2|123456782^gastric ||SER|||||||P||||||200309060755|200309060821||Y||||||1
SPM|3|123456783^gastric ||SER|||||||P||||||200309060815|200309060821||N|RB|||||1
SPM|4|123456784^gastric ||SER|||||||P||||||200309060835|200309060902||Y||||||1
SPM|5|123456785^gastric ||SER|||||||P||||||200309060855|200309060902||Y||||||1
```

The related acknowledgement message isn't shown.

9.3.3.14 LAB-3 (OF → ORT): Message "Status changed"

Jane CHEMISTRY-EXPERT has performed the clinical validation at 9h29. The order is completed. The results are final.

```
MSH|^~\&|OF|Chemistry|ORT||200309060930||OUL^R24^OUL_R24|msgOF110|T|2.5|123||||USA|
|EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
OBR||12345678^gastric|555^chemistry|82951^Glucose Tolerance Test^CPT4||||||
1234^BLEEDER|S|||| |222222^PHYSICIAN^^^^DR|821||||||A|200309060929|||F|||||||
444444&CHEMISTRY-EXPERT&Jane^200309060929
ORC|SC|12345678^gastric||666^gastric|CM||||200309060929|222221^NURSE^NANCY|||||||||
||Entero-gastric^^^^^^FI^^^EG02
TQ1|||||||||A
SPM|1|123456781^gastric ||SER|||||||P||||||200309060735|200309060821||Y||||||1
OBX|1|NM|14996-3^GLUCOSE PRE 75 G GLUCOSE PO^LN||4200|umol/l|4000-6100|N|||
F|||200309060830
SPM|2|123456782^gastric ||SER|||||||P||||||200309060755|200309060821||Y||||||1
OBX|1|NM|30263-8^GLUCOSE 20M POST DOSE GLUCOSE^LN||6000|umol/l|<7800|N|||
F|||200309060832
SPM|3|123456783^gastric ||SER|||||||P||||||200309060815|200309060821||N|RB|||||1
OBX|1|NM|30264-6^GLUCOSE 40M POST DOSE GLUCOSE^LN|||||||X
SPM|4|123456784^gastric ||SER|||||||P||||||200309060835|200309060902||Y||||||1
OBX|1|NM|14756-1^GLUCOSE 1H POST DOSE GLUCOSE^LN||7200|umol/l|<7800|N|||
F|||200309060910
SPM|5|123456785^gastric ||SER|||||||P||||||200309060855|200309060902||Y||||||1
OBX|1|NM|30265-3^GLUCOSE 1.3H POST DOSE GLUCOSE^LN||7100|umol/l|<7800|N|||
F|||200309060911
OBX|1|NM|GLUCOSE||75|g|||||F|||200309060735
```

The related acknowledgement message isn't shown.

9.4 Battery with 2 specimens: Creatinine clearance

9.4.1 Storyboard

This example corresponds to the use case described in Volume 1 as "Externally placed order with specimens unidentified or to be collected by the laboratory". The specimens are not identified by the ordering care unit.

Dr Nephro orders one battery of one test: a creatinine clearance.

The battery consists of a procedure applied on two specimen type, serum and 24 hour urine. At the end of the 24 hour urine collection process, the specimen collector mesures the collected urine volume, records the duration of collection, takes a urine sample from the 24 hours collection and draws a serum sample from the patient.

The order is assumed to be part of a group of placer orders identified by the placer group number '777'.

Human actors and organizations participating to the process:

Assigning authority:	Abbeville Hospital
Placer:	Nephrology department.
Filler:	Chemistry laboratory.
Ordering facility:	Nephrology.
Patient:	John Ill, Patient hospital identifier: 6543210, Patient visit number: 999888, class = inpatient
Orderer:	Dr Nephro.
Placer order enterer:	Janet Nurse.
Specimen collector:	John Collect.
Technician:	Marc Techos.
Clinical expert:	Jane Chemistry.

ID numbers used by the workflow:

ID number	Value	Assigned by
Patient hospital ID	6543210	Admission office (ADT)
Patient visit number	9998888	Admission office (ADT)
Care unit order group	777	Nephrology department (OP)
Care unit order	9876543	Nephrology department (OP)
Laboratory order (1st battery) idem for work order	654	Chemistry laboratory (OF)
Specimen Serum	654_1	Chemistry laboratory (OF)
Specimen Urine	654_2	Chemistry laboratory (OF)

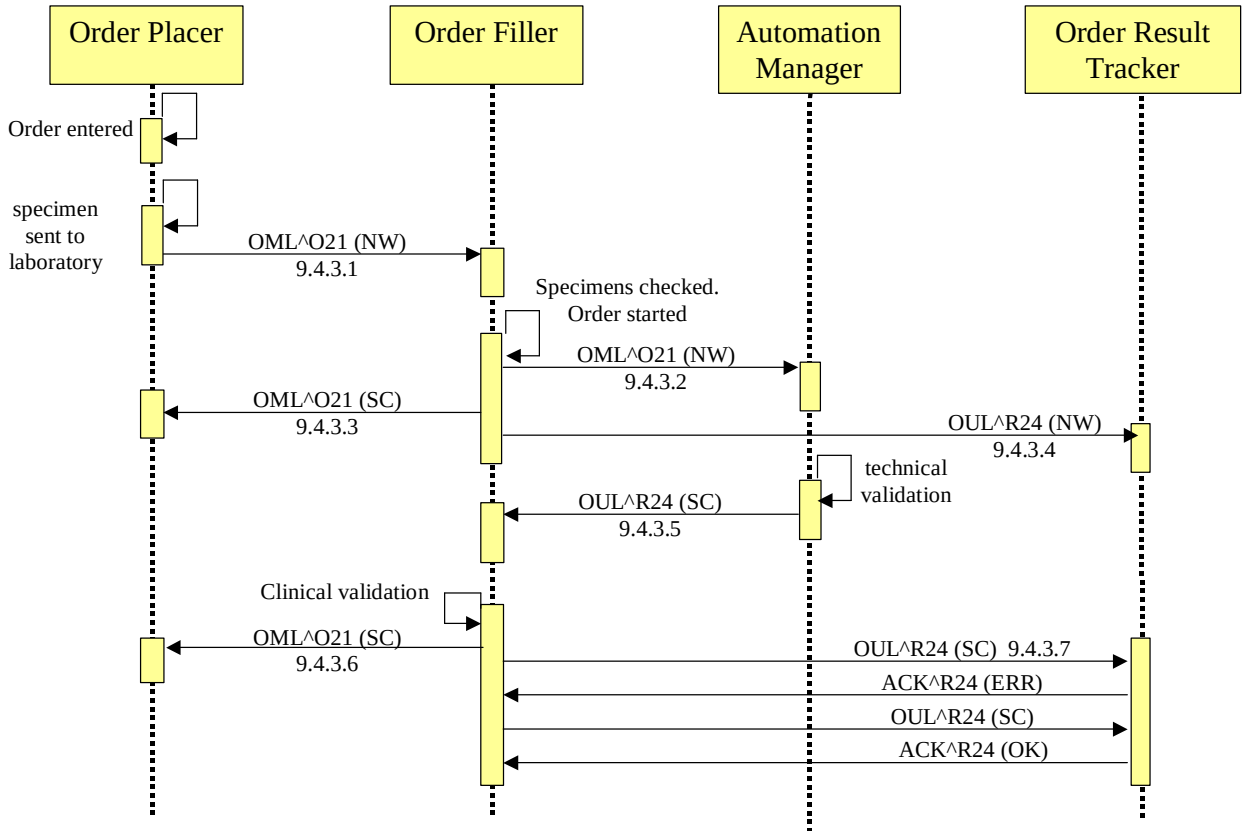
LAB-1 interaction: The Care Unit processes the specimen collection related to an order for a creatinine clearance, and sends the notified or measured values and the specimens to the chemistry laboratory. The Order Placer sends a message "new order" (NW) accompanying the specimen, to let the laboratory start the testing.

LAB-4, LAB-1 and LAB-3 interactions: The laboratory checks the specimens and schedules the work. An identifier is assigned to the specimens by the Order Filler and the corresponding identification labels are printed out. The Order Filler sends a unique work order to the Automation Manager. The Order Filler notifies both Order Placer and Order Result Tracker of the scheduled work.

LAB-5, LAB-1 and LAB-3 interactions: After technical validation by a laboratory technician (Marc Techos), the Automation Manager sends back all the observations to the Order Filler.

LAB-1 and LAB-3 interactions: After clinical validation, the Order Filler notifies the results to the Order Result Tracker, and notifies the status change to the Order Placer. The last interaction in transaction LAB-3 shows a a negative acknowledgement and a repetition of the message followed by the final positive acknowledgement.

9.4.2 Interaction diagram



9.4.3 Messages

9.4.3.1 LAB-1 (OP → OF): Message "New order" with one specimen

A new placer order sent to the Order Filler:

```
MSH|^~\&|OP|Nephrology|OF|Chemistry|200310060820||OML^O21^OML_O21|001|T|2.5|||||USA
||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||9998888
ORC|NW|9876543^Nephro||777^Nephro|||||200310060710|^NURSE^JANET||||||||||
Nephrology^^^^^^FI^^^NE03
TQ1|1|||||||R
OBR|1|9876543^Nephro||82575^Creatinine clearance^CPT4||||||^COLLECT^JOHN|S|||||
^NEPHRO^^^^DR
OBX|1|NM|13362-9^URINE COLLECTION DURATION^LN||24|hr|||||F|||200309060735
OBX|2|NM|19153-6^URINE SPECIMEN VOLUME^LN||2500|ml|||||F|||200309060735
SPM|1|||SER|||||||P||||||200310060735|||||||||1
SPM|2|||UR|||||||P||||||200310060735|||||||||1
```

The related acknowledgement message isn't shown.

9.4.3.2 LAB-4 (OF → AM): Message "New order"

A new work order is sent to the Automation Manager:

```
MSH|^~\&|OF|Chemistry|AM|Automation|200310060825||OML^O21^OML_O21|011|T|2.5|||||USA
||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||9998888
ORC|NW|||777^Nephro |||||200310060710|^NURSE^JANET||||||||||
Nephrology^^^^^^FI^^^NE03
TQ1|1|||||||R
OBR|1|654^chemistry||82575^Creatinine clearance^CPT4||||||^COLLECT^JOHN|S|||||
^NEPHRO^^^^DR
OBX|1|NM|13362-9^URINE COLLECTION DURATION^LN||24|hr|||||F|||200309060735
OBX|2|NM|19153-6^URINE SPECIMEN VOLUME^LN||2500|ml|||||F|||200309060735
SPM|1|654_1^chemistry||SER|||||||P||||||200310060735|200310060821|||||||1
SPM|2|654_2^chemistry||UR|||||||P||||||200310060735|200310060821|||||||1
```

The related acknowledgement message isn't shown.

9.4.3.3 LAB-1 (OF → OP): Message "Status changed"

The placer order has been assigned a filler order number, the specimen is available and identified by the laboratory:

```
MSH|^~\&|OF|Chemistry|OP|Nephrology|200310060825||OML^O21^OML_O21|012|T|2.5|||||USA
||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||9998888
ORC|SC|9876543^Nephro||777^Nephro|IP||||200310060710|^NURSE^JANET||||||||||
Nephrology^^^^^^FI^^^NE03
TQ1|1|||||||R
OBR|1|9876543^Nephro|654^chemistry|82575^Creatinine clearance^CPT4|
|||||^COLLECT^JOHN|P|||||^NEPHRO^^^^DR|||||||||I
SPM|1|654_1^chemistry||SER|||||||P||||||200310060735|200310060821|||Y||||||1
SPM|2|654_2^chemistry||UR|||||||P||||||200310060735|200310060821|||Y||||||1
```

The related acknowledgement message isn't shown.

9.4.3.4 LAB-3 (OF->ORT): Message “New Order”

The Order Result Tracker is notified with the creation of the filler order:

```
MSH|^~\&|OF|Chemistry|ORT||200310060825||OUL^R24^OUL_R24|013|T|2.5|||||USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||9998888
OBR|1|9876543^Nephro|654^chemistry|82575^Creatinine clearance^CPT4|
|||||^COLLECT^JOHN|P|||||^NEPHRO^^^^DR|||||||||I
ORC|SC|9876543^Nephro||777^Nephro|IP||||200310060710|^NURSE^JANET||||||||||
Nephrology^^^^^^FI^^^NE03
TQ1|1|||||||R
OBX|1|NM|13362-9^URINE COLLECTION DURATION^LN||24|hr|||||F|||200309060735
OBX|2|NM|19153-6^URINE SPECIMEN VOLUME^LN||2500|ml|||||F|||200309060735
SPM|1|654_1^chemistry||SER|||||||P||||||200310060735|200310060821||Y||||||1
SPM|2|654_2^chemistry||UR|||||||P||||||200310060735|200310060821||Y||||||1
```

The related acknowledgement message isn’t shown.

9.4.3.5 LAB-5 (AM->OF): Message “New Results”

The Automation Manager sends the final results for the work order:

```
MSH|^~\&|AM|Automation|OF|Nephrology|200310060900||OUL^R24^OUL_R24|3331|T|2.5|||||
USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||9998888
OBR|1|654^chemistry||82575^Creatinine clearance^CPT4||||||^COLLECT^JOHN|
P|||||^NEPHRO^^^^DR|||||||200310060832|||F|||||||&TECHOS&MARC^200310060833
ORC|SC||||CM||||200310060710|^NURSE^JANET||||||||||Nephrology^^^^^^FI^^^NE03
SPM|1|654_1^chemistry||SER|||||||P||||||200310060735|200310060821||Y||||||1
OBX|1|NM|15045-8^SERUM CREATININE^LN||93|umol/l|50-100|N|||F|||200310060830
SPM|2|654_2^chemistry||UR|||||||P||||||200310060735|200310060821||Y||||||1
OBX|1|NM|14684-5^24H URINE CREATININE ^LN||7.06|mmol|8-16 (/24hr)|L|||F|||
200310060830
OBX|2|NM|2164-2^CREATININE CLEARANCE^LN||52.7|ml/min|88-174|L||S|F|||200310060830
```

The related acknowledgement message isn’t shown.

9.4.3.6 LAB-1 (OF->OP): Message “Status Changed”

The clinical expert has performed the clinical validation at 09h29. The order is completed:

```
MSH|^~\&|OF|Nephrology|OP|Nephrology|200310060930||OML^O21^OML_O21|014|T|2.5|||||
USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||9998888
ORC|SC|9876543^Nephro||777^Nephro|CM||||200310060710|^NURSE^JANET||||||||||
Nephrology^^^^^^FI^^^NE03
TQ1|1|||||||R
OBR|1|9876543^Nephro|654^chemistry|82575^Creatinine clearance^CPT4|
|||||^COLLECT^JOHN|P|||||^NEPHRO^^^^DR|||||||||F|||||||&CYTO&JANE^200310060929
SPM|1|654_1^chemistry||SER|||||||P||||||200310060735|200310060821||Y||||||1
SPM|2|654_2^chemistry||UR|||||||P||||||200310060735|200310060821||Y||||||1
```

The related acknowledgement message isn’t shown.

9.4.3.7 LAB-3 (OF->ORT): Message “Status Changed”

The clinical expert has performed the clinical validation at 09h29. The order is completed. The results are final:

```
MSH|^~\&|OF|Chemistry|ORT||200310060931||OUL^R24^OUL_R24|015|T|2.5|||||USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||9998888
OBR|1|9876543^Nephro|654^chemistry |82575^Creatinine clearance^CPT4||||||
^COLLECT^JOHN |P|||||^NEPHRO^^^^DR|||||||200310060929|||F|||||||
&CYTO&JANE^200310060929
ORC|SC|9876543^Nephro||777^Nephro|CM||||200310060710|^NURSE^JANET||||||||||
Nephrology^^^^^^FI^^^NE03
TQ1|1|||||||R
SPM|1|654_1^chemistry||SER|||||||P||||||200310060735|200310060821||Y||||||1
OBX|1|NM|15045-8^SERUM CREATININE^LN||93|umol/l|50-100|N|||F|||200310060830
SPM|2|654_2^chemistry||UR|||||||P||||||200310060735|200310060821||Y||||||1
OBX|1|NM|13362-9^URINE COLLECTION DURATION^LN||24|hr|||||F|||200309060735
OBX|2|NM|19153-6^URINE SPECIMEN VOLUME^LN||2400|ml|||||F|||200309060735
OBX|3|NM|14684-5^24H URINE CREATININE^LN||7.06|mmol|8-16 (/24hr)|L|||F|||
200310060830
OBX|4|NM|2164-2^CREATININE CLEARANCE^LN||52.7|ml/min|88-174|L||S|F|||200310060830
```

Negative acknowledgement sent by the Order Results Tracker:

The ERR-4 = ‘E’ indicates that the message could not be integrated. The ERR-3 HL7 error code = 206 informs of the cause: a database locked. The MSA-1 = ‘AE’ asks the sender to repeat its message later.

```
MSH|^~\&|ORT||OF|Cytology|200310060932||ACK^R24|401|T|2.5|||||USA|EN
MSA|AE|015
ERR|||206^Application record locked|E
```

Repetition of the same result message by the Order Filler, one minute later

```
MSH|^~\&|OF|Chemistry|ORT||200310060931||OUL^R24^OUL_R24|015|T|2.5|||||USA||EN
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||||||||||||9998888
OBR|1|9876543^Nephro|654^chemistry |82575^Creatinine clearance^CPT4||||||
^COLLECT^JOHN |P|||||^NEPHRO^^^^DR|||||||200310060929|||F|||||||
&CYTO&JANE^200310060929
ORC|SC|9876543^Nephro||777^Nephro|CM||||200310060710|^NURSE^JANET||||||||||
Nephrology^^^^^^FI^^^NE03
TQ1|1|||||||R
SPM|1|654_1^chemistry||SER|||||||P||||||200310060735|200310060821||Y||||||1
OBX|1|NM|15045-8^SERUM CREATININE^LN||93|umol/l|50-100|N|||F|||200310060830
SPM|2|654_2^chemistry||UR|||||||P||||||200310060735|200310060821||Y||||||1
OBX|1|NM|13362-9^URINE COLLECTION DURATION^LN||24|hr|||||F|||200309060735
OBX|2|NM|19153-6^URINE SPECIMEN VOLUME^LN||2400|ml|||||F|||200309060735
OBX|3|NM|14684-5^24H URINE CREATININE^LN||7.06|mmol|8-16 (/24hr)|L|||F|||
200310060830
OBX|4|NM|2164-2^CREATININE CLEARANCE^LN||52.7|ml/min|88-174|L||S|F|||200310060830
```

Positive acknowledgement sent by the Order Results Tracker:

```
MSH|^~\&|ORT||OF|Cytology|200310060935||ACK^R24|401|T|2.5|||||USA|EN
MSA|AA|015
```


9.5 Microbiology with two specimens and three germs identified

9.5.1 Storyboard

This storyboard illustrates the use of transaction LAB-2 to notify generated batteries at the Order Filler level (i.e. antibiotic susceptibilities, within the same placer group number).

Dr Physician orders Microscopy and Culture for two different specimens collected from the same patient. The first specimen is Mid Stream Urine and the second one is Pus taken from a wound on patient's left toe. Since several batteries could be performed on each specimen (e.g. Microscopy and Culture, identification of organism, Antibiotic Susceptibility) the Order Placer transmits an OML^O33 message. Since both specimens are part of the same prescription, they are grouped via the Placer Group Number '777'.

The patient is an Outpatient in Emergency ward.

We presume that all tests are performed manually and that results are directly entered by the laboratory technician in the Order Filler system, there is then neither LAB-4, nor LAB-5 transaction in this story board. We also presume that results for observations related to the urine specimen are transferred as soon they are available, whilst the Clinical Expert desires to review results related to other specimen types before they are released.

Human actors and organizations participating to the process:

Assigning authority: Memphis Hosp 1

Placer: Emergency Ward

Filler: Microbiology

Ordering facility: Emergency Ward

Patient: Adam Everyman Jr, account number: 12345 (check-digit 5 modulo 10), class = outpatient.

Order placed by: Dr PHYSICIAN, phone number 821, ID number in the hospital 222222.

Placer order enterer: Nancy NURSE, ID number 222221

Specimen collector: Nancy NURSE, ID number 222221

Technician: Terry BACK, ID number 333231

Clinical expert: Mike ROSCOP, ID number 444642.

ID numbers used by the workflow:

ID number	Value	Assigned by
Patient ID	12345	Admission office (ADT)
Care unit order for Urine Spec.	12345679	Emergency Ward (OP)
Care unit order for Pus Spec.	12345670	Emergency Ward (OP)
Care unit order group	777	Emergency Ward (OP)
1st specimen	123456791	Emergency Ward (OP)
2nd specimen	123456701	Emergency Ward (OP)
Laboratory order for the Urine	MSU0309922	Microbiology laboratory (OF)
Laboratory order for the PUS	PUS0300666	Microbiology laboratory (OF)

Day 1 at 8:10 LAB-1 interaction: The two specimens are collected and transmitted to the Microbiology laboratory in Routine. The Order Placer sends a message "new order" (NW) to the order placer.

Day 1 at 8:20 LAB-1 and LAB-3 interactions: The laboratory checks the specimens and schedules the work. The Order Filler notifies both Order Placer and Order Result Tracker of the scheduled work.

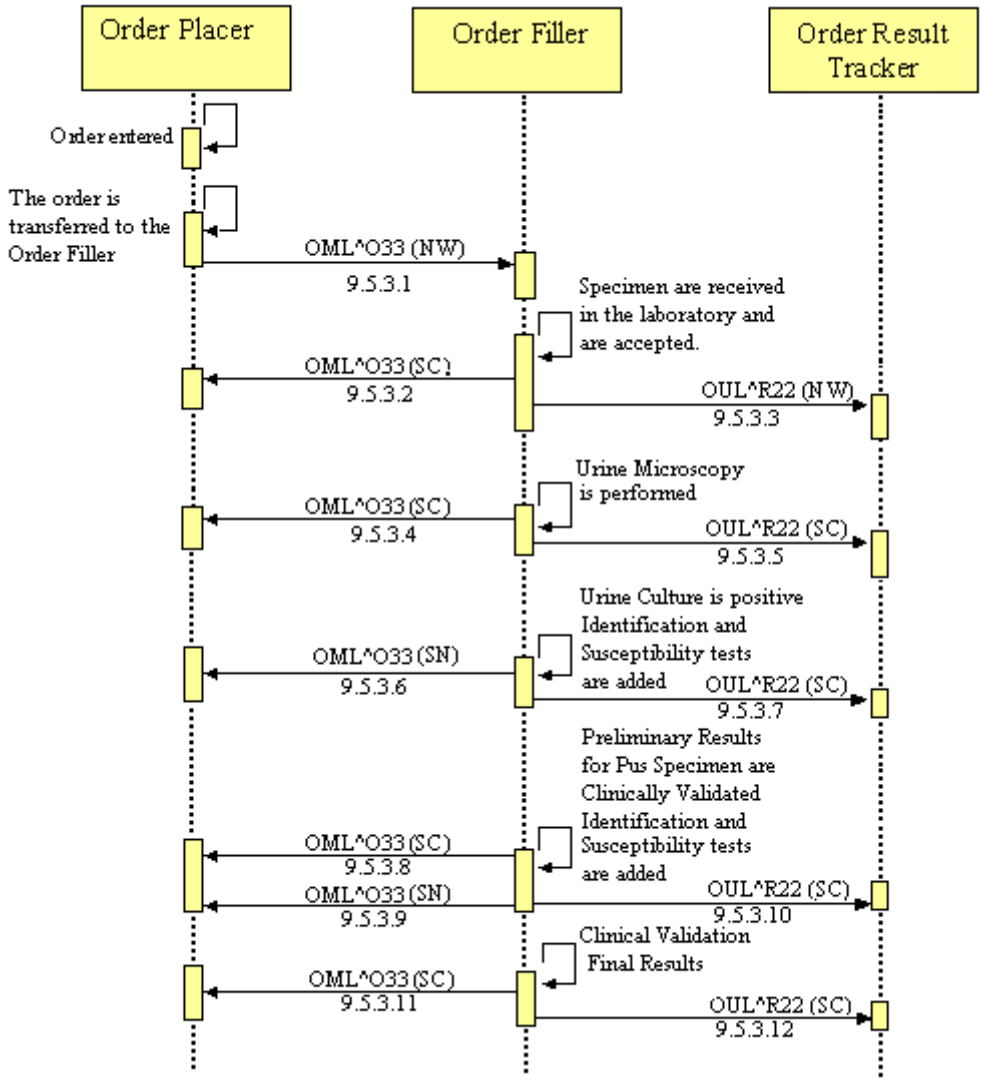
Day 1 at 14:46 LAB-1 and LAB-3 interactions: After Microscopy for the Urine Specimen is achieved, the Order Filler notifies these partial results to the Order Result Tracker, and notifies the status change to the Order Placer, without waiting for the clinical validation.

Day 2 at 09:40 LAB-2 and LAB-3 interactions: The following day, the Urine culture is positive, the laboratory adds Organism identification and Antibiotic Susceptibility test for this specimen. The Order Filler requires a Placer Order Number to the Order Placer for the added tests (Transaction LAB-2) and notifies this action to the Order Result Tracker via transaction LAB-3. There is no need for LAB-1 transaction as the Result status for Urine Microscopy and Culture has not changed.

Day 2 at 09:45 LAB-1, LAB-2 and LAB-3 interactions: The result of Microscopy and Culture is positive for the Pus specimen, the clinical expert has validated these preliminary results and the laboratory adds Organism identification and Antibiotic Susceptibility test for this specimen. The Order Filler notifies the new result status to the Order Placer (Transaction LAB-1), it requires a Placer Order Number to the Order Placer for the added tests (Transaction LAB-2) and it notifies this action to the Order Result Tracker via transaction LAB-3.

Day 3 at 11:32 LAB-1 and LAB-3 interactions: The next day, organism identification and Antibiotic Susceptibility tests are achieved; final results are transmitted to the Order Result Tracker after the clinical validation has been performed. The Order Filler notified the status change to the Order Placer.

9.5.2 Interaction diagram



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9.5.3 Messages

9.5.3.1 LAB-1 (OP → OF): Message "New order" with two specimens

Day 1 at 8:10 A new placer order sent to the Order Filler.

```
MSH|^~\&|OP|Emergency Ward|OF|Microbiology|200309060810||OML^O33^OML_O33|msgOP123|
T|2.5|123 ||||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
SPM|1|123456791^Emergency||MSU^Mid Stream Urine^L|||||||P||||||
200309060800|||||||||1
ORC|NW|12345679^Emergency||777^Emergency|||||200309060800|222221^NURSE^NANCY|||||||
||||Emergency Ward^^^^^^FI^^^EW00
TQ1|||||||||R
OBR|1|12345679^Emergency||87086^Urine Microscopy and Culture^CPT4|||||||S|||||
222222^PHYSICIAN^^^^DR|
SPM|2|123456701^Emergency||PUS||||TOE|LEFT||P||||||200309060805|||||||||1
ORC|NW|12345670^Emergency||777^Emergency|||||200309060800|222221^NURSE^NANCY|||||||
||||Emergency Ward^^^^^^FI^^^EW00
TQ1|||||||||R
OBR|1|12345670^Emergency||87040^Microscopy and Culture^CPT4||||||222221^NURSE^NANCY
|S|||||222222^PHYSICIAN^^^^DR|
```

The related acknowledgement message isn't shown.

9.5.3.2 LAB-1 (OF → OP): Message "Status changed"

Day 1 at 8:20 Specimens have been received by the laboratory. A filler order number has been assigner to the order.

```
MSH|^~\&|OF|Microbiology|OP|Emergency Ward|200309060820||OML^O33^OML_O33|msgOF11|
T|2.5|123 ||||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
SPM|1|123456791^Emergency||MSU^Mid Stream
Urine^L|||||||P||||||200309060800|200309060818||Y|…
ORC|SC|12345679^Emergency||777^Emergency|IP||||200309060818||||||||||||
Emergency Ward^^^^^^FI^^^EW00
OBR|1|12345679^Emergency|MSU0309922^Micro|87086^Urine Microscopy and
Culture^CPT4|||||||S|||||222222^PHYSICIAN^^^^DR|
SPM|2|123456701^Emergency||PUS||||TOE|LEFT||P||||||200309060805|200309060818||Y|…
ORC|SC|12345670^Emergency||777^Emergency|IP||||200309060818||||||||||||
Emergency Ward^^^^^^FI^^^EW00
OBR|1|12345670^Emergency|PUS0300666^Micro|87040^Microscopy and Culture^CPT4
||||||222221^NURSE^NANCY |S|||||222222^PHYSICIAN^^^^DR|
```

The related acknowledgement message isn't shown.

9.5.3.3 LAB-3 (OF → ORT): Message "New order"

Day 1 at 8:20 The Order Result Tracker is notified with the creation of the filler order:

```
MSH|^~\&|OF|Microbiology|ORT||200309060820||OUL^R22^OUL_R22|msgOF12|T|2.5|123||||
USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
SPM|1|123456791^Emergency||MSU^Mid Stream
Urine^L|||||||P||||||200309060800|200309060818||Y|…
OBR|1|12345679^Emergency|MSU0309922^Micro|87086^Urine Microscopy and
Culture^CPT4|||||||  |||||222222^PHYSICIAN^^^^DR|
ORC|SC|12345679^Emergency||777^Emergency|IP||||200309060818||||||||||||
```



```
Emergency Ward^^^^^^FI^^^EW00
SPM|2|123456701^Emergency||PUS||||TOE|LEFT||P||||||200309060805|200309060818||Y|…
OBR|1|12345670^Emergency|PUS0300666^Micro|87040^Microscopy and
Culture^CPT4||||||222221^NURSE^NANCY ||||||222222^PHYSICIAN^^^^DR|
ORC|NW|12345670^Emergency||777^Emergency|IP||||200309060818||||||||||||
Emergency Ward^^^^^^FI^^^EW00
```

The related acknowledgement message isn't shown.

9.5.3.4 LAB-1 (OF → OP): Message "Status changed"

Day 1 at 14:46 Urine Microscopy results are available, not clinically validated (i.e. not verified)

```
MSH|^~\&|OF|Microbiology|OP|Emergency Ward|200309061446||OML^O33^OML_O33|msgOF13|
T|2.5|123 ||||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
SPM|1|123456791^Emergency||MSU^Mid Stream Urine^L|||||||P||||||200309060800|
200309060818||Y|…
ORC|SC|12345679^Emergency||777^Emergency|A||||200309060818||||||||||||
Emergency Ward^^^^^^FI^^^EW00
OBR|1|12345679^Emergency|MSU0309922^Micro|87086^Urine Microscopy and culture^CPT4|
||||||P|||| |222222^PHYSICIAN^^^^DR|
```

The related acknowledgement message isn't shown.

9.5.3.5 LAB-3 (OF → ORT): Message "Status changed"

Day 1 at 14:46 Urine Microscopy results are sent, not clinically validated (i.e. not verified):

```
MSH|^~\&|OF|Microbiology|ORT||200309061446||OUL^R22^OUL_R22|msgOF14|T|2.5|123||||US
A||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
SPM|1|123456791^Emergency||MSU^Mid Stream
Urine^L|||||||P||||||200309060800|200309060818||Y|…
OBR|1|12345679^Emergency|MSU0309922^Micro|87086^Urine Microscopy and
Culture^CPT4||||||| |||||222222^PHYSICIAN^^^^DR|||||||MB|A
ORC|SC|12345679^Emergency||777^Emergency|A||||200309060818||||||||||||
Emergency Ward^^^^^^FI^^^EW00
TQ1|||||||||R
OBX|1|CE|20453-7^Epithelial Cells^LN||value|||N|||R|||200309061445|
|333231^BACK^TERRY
OBX|2|NM|20455-2^Leukocytes^LN||value|/ml||N|||R|||200309061445| |333231^BACK^TERRY
OBX|3|NM|32776-7^Erythrocytes^LN||value|/ml||N|||R|||200309061445|
|333231^BACK^TERRY
OBX|4|CE|24124-0^Casts^LN||value|||N|||R|||200309061445||333231^BACK^TERRY
OBX|5|NM|699-9^Organism Count^LN||value|/ml||N|||R|||200309061445|
|333231^BACK^TERRY
OBX|6||20430-5^Culture^LN|||||N|||I|||200309070935||333231^BACK^TERRY
```

The related acknowledgement message isn't shown.

9.5.3.6 LAB-2(OF → OP): Message "Send Order Number"

Day 2 at 9:40 Urine Culture is positive, Organism Identification and Antibiotic Susceptibility tests are added:


```
MSH|^~\&|OF|Microbiology|OP|Emergency Ward|200309070940||OML^O33^OML_O33|msgOF15|
T|2.5|123 ||||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
SPM|1|123456791^Emergency||MSU^Mid Stream
Urine^L|||||||P||||||200309060800|200309060818||Y|…
ORC|SN|||777^Emergency|||||200309070938|333231^BACK^TERRY||||||||||
Emergency Ward^^^^^^FI^^^EW00
OBR|1||MSU0309922^Micro|87088^Organism Identification^CPT4|||||||
G|||||222222^PHYSICIAN^^^^DR|||||||MB
ORC|SN|||777^Emergency|||||200309070938|333231^BACK^TERRY||||||||||Emergency
Ward^^^^^^FI^^^EW00
OBR|2||MSU0309922^Micro|87186^Antibiotic Susceptibility^CPT4|||||||
G|||||222222^PHYSICIAN^^^^DR|||||||MB
```

Acknowledgement sent by the Order Placer:

```
MSH|^~\&|OP|Emergency
Ward|OF|Microbiology|200309070940||ORL^O34^ORL_O34|msgOP123|T|2.5|123 ||||USA||EN
MSA|AA| msgOF15
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
SPM|1|123456791^Emergency||MSU^Mid Stream
Urine^L|||||||P||||||200309060800|200309060818||Y|…
ORC|NA|12345681^Emergency||777^Emergency|||||200309070938|333231^BACK^TERRY|||||||
|||Emergency Ward^^^^^^FI^^^EW00
OBR|1|12345681^Emergency|MSU0309922^Micro|87088^Organism Identification^CPT4|||||||
G|||||222222^PHYSICIAN^^^^DR|||||||MB
ORC|NA|12345682^Emergency||777^Emergency|||||200309070938|333231^BACK^TERRY|||||||
|||Emergency Ward^^^^^^FI^^^EW00
OBR|2|12345682^Emergency|MSU0309922^Micro|87186^Antibiotic
Susceptibility^CPT4|||||||  G|||||222222^PHYSICIAN^^^^DR|||||||MB
```

9.5.3.7 LAB-3 (OF → ORT): Message "Status Changed"

Day 2 at 09:42 Result for Urine Microscopy and Culture are available. Organism Identification and Antibiotic Susceptibility tests have been added

Note: The Order Placer has acknowledged transaction LAB-2 and an Order Placer Number has been added to each test added by the laboratory

```
MSH|^~\&|OF|Microbiology|ORT||200309070942||OUL^R22^OUL_R22|msgOF16|T|2.5|123||||US
A||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
SPM|1|123456791^Emergency||MSU^Mid Stream Urine^L|||||||P||||||200309060800|
200309060818||Y|…
OBR|1|12345679^Emergency|MSU0309922^Micro|87086^Urine Microscopy and
Culture^CPT4|||||||  |||||222222^PHYSICIAN^^^^DR|||||||MB|R
ORC|SC|12345679^Emergency||777^Emergency|A||||200309060818||||||||||||
Emergency Ward^^^^^^FI^^^EW00
TQ1|||||||||R
OBX|1|CE|20453-7^Epithelial Cells^LN||value|||N|||R|||200309061445|
|333231^BACK^TERRY
OBX|2|NM|20455-2^Leukocytes^LN||value|/ml||N|||R|||200309061445| |333231^BACK^TERRY
OBX|3|NM|32776-7^Erythrocytes^LN||value|/ml||N|||R|||200309061445|
|333231^BACK^TERRY
OBX|4|CE|24124-0^Casts^LN||value|||N|||R|||200309061445||333231^BACK^TERRY
OBX|5|NM|699-9^Organism Count^LN||value|/ml||N|||R|||200309061445|
|333231^BACK^TERRY
OBX|6|CE|20430-5^Culture^LN||2ORG^Two Organisms^L|||N|||R|||200309070935|
|333231^BACK^TERRY
OBR|2|12345681^Emergency|MSU0309922^Micro|87088^Organism Identification^CPT4|||||||
G|||||222222^PHYSICIAN^^^^DR|||||||MB|S
```



```
ORC|SC|12345681^Emergency||777^Emergency|IP||||200309070938|333231^BACK^TERRY||||||
|||||Emergency Ward^^^^^^FI^^^EW00
OBR|3|12345682^Emergency|MSU0309922^Micro|87186^Antibiotic
Susceptibility^CPT4||||||| G|||||222222^PHYSICIAN^^^^DR|||||||MB|S
ORC|SC|12345682^Emergency||777^Emergency|IP||||200309070938|333231^BACK^TERRY||||||
|||||Emergency Ward^^^^^^FI^^^EW00
```

The related acknowledgement message isn't shown.

9.5.3.8 LAB-1 (OF → OP): Message "Status changed"

Day 2 at 09:45 Microscopy and Culture results are available for the Pus specimen,

```
MSH|^~\&|OF|Microbiology|OP|Emergency Ward|200309070940||OML^O33^OML_O33|msgOF17|
T|2.5| 123||||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
SPM|1|123456701^Emergency||PUS||||TOE|LEFT||P||||||200309060805|200309060818||Y|…
ORC|SC|12345670^Emergency||777^Emergency|A||||200309060818||||||||||||
Emergency Ward^^^^^^FI^^^EW00
OBR|1|12345670^Emergency|PUS0300666^Micro|87040^Microscopy and Culture^CPT4|||||||
|||||222222^PHYSICIAN^^^^DR|
```

The related acknowledgement message isn't shown.

9.5.3.9 LAB-2(OF → OP): Message "Send Order Number"

Day 2 at 9:45 Culture for Pus specimen is positive, Organism Identification and Antibiotic Susceptibility tests are added:

```
MSH|^~\&|OF|Microbiology|OP|Emergency Ward|200309070945||OML^O33|msgOF18|T|2.5|123
||||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
SPM|1|123456701^Emergency||PUS||||TOE|LEFT||P||||||200309060805|200309060818||Y|…
ORC|SN|||777^Emergency|||||200309070941|333231^BACK^TERRY||||||||||||
Emergency Ward^^^^^^FI^^^EW00
OBR|1||PUS0300666^Micro|87088^Organism Identification^CPT4|||||||
G|||||222222^PHYSICIAN^^^^DR|||||||MB
ORC|SN|||777^Emergency|||||200309070941|333231^BACK^TERRY||||||||||||
Emergency Ward^^^^^^FI^^^EW00 OBR|2||PUS0300666^Micro|87186^Antibiotic
Susceptibility^CPT4||||||| G|||||222222^PHYSICIAN^^^^DR|||||||MB
```

Acknowledgement sent by the Order Placer:

```
MSH|^~\&|OP|Emergency
Ward|OF|Microbiology|200309070945||ORL^O34^ORL_O34|msgOP124|T|2.5| 123||||USA||EN
MSA|AA|msgOF18
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
SPM|1|123456701^Emergency||PUS||||TOE|LEFT||P||||||200309060805|200309060818||Y|…
ORC|NA|12345685^Emergency||777^Emergency|||||200309070941|333231^BACK^TERRY|||||||
|||Emergency Ward^^^^^^FI^^^EW00
OBR|1|12345685^Emergency|PUS0300666^Micro|87088^Organism Identification^CPT4|||||||
G|||||222222^PHYSICIAN^^^^DR|||||||MB
ORC|NA|12345686^Emergency||777^Emergency|||||200309070941|333231^BACK^TERRY|||||||
|||Emergency Ward^^^^^^FI^^^EW00
OBR|2|12345686^Emergency|PUS0300666^Micro|87186^Antibiotic
Susceptibility^CPT4|||||||G|||||222222^PHYSICIAN^^^^DR|||||||MB
```


9.5.3.10 LAB-3 (OF → ORT): Message "Status Changed"

Day 2 at 09:45 The Clinical Expert has validated the preliminary results of Microscopy and culture for the Pus Specimen.

Note: Although the Culture is positive, the result status is not "Final" other Organisms may grow during the next 24 hours. Results of culture will be considered as final on Day 3 after 48 hours of incubation.

```
MSH|^~\&|OF|Microbiology|ORT||200309070945||OUL^R22^OUL_R22|msgOF19|T|2.5|123||||
USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
SPM|1|123456701^Emergency ||PUS||||TOE|LEFT||P||||||200309060805|200309060818||Y|…
OBR|1|12345670^Emergency|PUS0300666^Micro|87040^Microscopy and
Culture^CPT4||||||222221^NURSE^NANCY
||||||222222^PHYSICIAN^^^^DR|||||||MB|P|||||||444642&ROSCOP&Mike^200309070944
ORC|SC|12345670^Emergency||777^Emergency|A||||200309060818||||||||||||
Emergency Ward^^^^^^FI^^^EW00
OBX|1|NM|32761-9^Leukocytes^LN||value|||N|||F|||200309061125||333231^BACK^TERRY
OBX|2|NM|32762-7^Epithelial Cells^LN||value|||N|||F|||200309061125|
|333231^BACK^TERRY
OBX|3|CE|20430-5^Culture^LN||POS^Positive^L|||N|||P|||200309070935|
|333231^BACK^TERRY
OBR|2|12345685^Emergency|PUS0300666^Micro|87088^Organism Identification^CPT4|||||||
G|||||  |||||||MB|S
ORC|SC|12345685^Emergency||777^Emergency|IP||||200309070941|333231^BACK^TERRY||||||
|||||Emergency Ward^^^^^^FI^^^EW00
OBR|3|12345686^Emergency|PUS0300666^Micro|87186^Antibiotic
Susceptibility^CPT4||||||| G|||||  |||||||MB|S
ORC|SC|12345686^Emergency||777^Emergency|IP||||200309070941|333231^BACK^TERRY||||||
|||||Emergency Ward^^^^^^FI^^^EW00
```

The related acknowledgement message isn't shown.

9.5.3.11 LAB-1 (OF → OP): Message "Status changed"

Day 3 at 11:32 Mike ROSCOP has performed the clinical validation at 11h30. The order is completed.

```
MSH|^~\&|OF|Microbiology|OP|Emergency Ward|200309081132||OML^O33^OML_O33|msgOF20|
T|2.5|123||||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
SPM|1|123456791^Emergency||MSU^Mid Stream
Urine^L|||||||P||||||200309060800|200309060818||Y|…
ORC|SC|12345679^Emergency||777^Emergency|CM||||200309060818||||||||||||
Emergency Ward^^^^^^FI^^^EW00
OBR|1|12345679|MSU0309922^Micro|87086^Urine Microscopy and Culture^CPT4||||||||||||
222222^PHYSICIAN^^^^DR|
ORC|SC|12345681^Emergency||777^Emergency|CM||||200309070938|333231^BACK^TERRY||||||
|||||Emergency Ward^^^^^^FI^^^EW00
OBR|2|12345679|MSU0309922^Micro|87088^Organism Identification^CPT4||||||||||||
222222^PHYSICIAN^^^^DR|
ORC|SC|12345682^Emergency||777^Emergency|CM||||200309070938|333231^BACK^TERRY||||||
|||||Emergency Ward^^^^^^FI^^^EW00
OBR|3|12345679|MSU0309922^Micro|87186^Antibiotic Susceptibility^CPT4||||||||||||
222222^PHYSICIAN^^^^DR
SPM|2|123456701^Emergency||PUS||||TOE|LEFT||P||||||200309060805|200309060818||Y|…
ORC|SC|12345670||777^Emergency|CM||||200309060818||||||||||||
Emergency Ward^^^^^^FI^^^EW00
OBR|1|12345670^Emergency|PUS0300666^Micro|87040^Microscopy and
Culture^CPT4|||||||||||| 222222^PHYSICIAN^^^^DR|
```



```
ORC|SC|12345685^Emergency||777^Emergency|CM||||200309070941|333231^BACK^TERRY||||||
|||||Emergency Ward^^^^^^FI^^^EW00
OBR|2|12345670|PUS0300666^Micro|87072^Organism Identification^CPT4||||||||||||
ORC|SC|12345686^Emergency||777^Emergency|CM||||200309070941|333231^BACK^TERRY||||||
|||||Emergency Ward^^^^^^FI^^^EW00
OBR|3|12345670|PUS0300666^Micro|87186^Antibiotic Susceptibility^CPT4||||||||||||
```

The related acknowledgement message isn't shown.

9.5.3.12 LAB-3 (OF → ORT): Message "Status changed"

Day 3 at 11:32 Mike ROSCOP has performed the clinical validation at 11h30. Final results are transmitted.

Note: In this message, the OBX-4 (Observation Sub-ID) is used to associate the results of each Antibiotic in the Susceptibility test to the appropriate organism. For the URINE specimen, the value 1 in the SUB ID field is used for the first organism (E.Coli) whilst the value 2 is used for the second organism (Strepto D). Although in the following example antibiotic susceptibility results for the two organisms are grouped under a single OBR segment, it could have been possible to use one OBR segment for the susceptibility test of each organism.

```
MSH|^~\&|OF|Microbiology|ORT||200309081132||OUL^R22^OUL_R22|msgOF21|T|2.5|
123||||USA||EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^^JR^^^L|19800101|M
PV1|1|O|Ward|||||||||||||12345
SPM|1|123456791^Emergency||MSU^Mid Stream
Urine^L|||||||P||||||200309060800|200309060818||Y|…
OBR|1|12345679^Emergency|MSU0309922^Micro|87086^Urine Microscopy and
Culture^CPT4|||||||
|||||222222^PHYSICIAN^^^^DR|||||||MB|F|||||||444642&ROSCOP&Mike^200309081130
ORC|SC|12345679^Emergency||777^Emergency|CM||||200309060818||||||||||||Emergency
Ward^^^^^^FI^^^EW00
TQ1|||||||||R
OBX|1|CE|20453-7^Epithelial Cells^LN||value|||N|||F|||200309061445|
|333231^BACK^TERRY
OBX|2|NM|20455-2^Leukocytes^LN||value|/ml||N|||F|||200309061445|…
OBX|3|NM|32776-7^Erythrocytes^LN||value|/ml||N|||F|||200309061445|…
OBX|4|CE|24124-0^Casts^LN||value|||N|||F|||200309061445||333231^BACK^TERRY
OBX|5|NM|699-9^Organism Count^LN||value|/ml||N|||F|||200309061445|…
OBX|6|CE|20430-5^Culture^LN||2ORG^Two Organisms^L|||N|||F|||200309070935|…
OBR|2|12345679^Emergency|MSU0309922^Micro|87088^Organism Identification^CPT4|||||||
|||||  ||||||||MB|F|||||||444642&ROSCOP&Mike^200309081130
ORC|SC|12345681^Emergency||777^Emergency|CM||||200309070938|333231^BACK^TERRY||||||
|||||Emergency Ward^^^^^^FI^^^EW00
OBX|1|NM|11475-1^Micro organism identified^LN|1|E. Coli|||N|||F|||…
OBX|2|NM|11475-1^Micro organism identified^LN|2|Strepto D|||N|||F|||…
OBR|3|12345679^Emergency|MSU0309922^Micro|87186^Antibiotic Susceptibility^CPT4
|||||||||||||||||||MB|F|||||||444642&ROSCOP&Mike^200309081130
ORC|SC|12345681^Emergency||777^Emergency|CM||||200309070938|333231^BACK^TERRY||||||
|||||Emergency Ward^^^^^^FI^^^EW00
OBX|1|SN|18861-5^Amoxicillin^LN|1|>=0.512|µg/ml||R|||F|||200309081107|…
OBX|2|SN|18864-9^Ampicillin^LN|1|<0.128|µg/ml||I|||F|||200309081107|…
OBX|3|SN|18952-2^Nalidixate^LN|1|>=2.0|µg/ml||R|||F|||200309081107|…
OBX|4|SN|18956-3^Norfloxacin^LN|1|value|µg/ml||I|||F|||200309081107|…
OBX|5|SN|18928-2^Gentamicin^LN|1|<0.032|µg/ml||S|||F|||200309081107|…
OBX|6|SN|25596-8^Fosfomycine^LN|1|<0.1|µg/ml||S|||F|||200309081107|…
OBX|7|SN|18955-5^Nitrofuranton^LN|1|<0.25|µg/ml||S|||F|||200309081107|…
OBX|8|SN|18965-4^Penicillin G^LN|2|<0.5|µg/ml||S|||F|||200309081107|…
OBX|9|SN|18861-5^Amoxicillin^LN|2|value|µg/ml||S|||F|||200309081107|…
OBX|10|SN|18864-9^Ampicillin^LN|2|value|µg/ml||S|||F|||200309081107|…
OBX|11|SN|18928-2^Gentamicin^LN|2|value|µg/ml||R|||F|||200309081107|…
OBX|12|SN|18917-5^Doxycycline^LN|2|value|µg/ml||R|||F|||200309081107|…
OBX|13|SN|18919-1^Erythromycin^LN|2|value|µg/ml||R|||F|||200309081107|…
OBX|14|SN|18974-6^Rifampicin^LN|2|value|µg/ml||S|||F|||200309081107|…
```



```
OBX|15|SN|18938-1^Lincomycin^LN|2|value|µg/ml||R|||F|||200309081107|…
SPM|2|123456701^Emergency||PUS||||TOE|LEFT||P||||||200309060805|200309060818||Y|…
OBR|1|12345670^Emergency|PUS0300666^Micro|87040^Microscopy and
Culture^CPT4||||||222221^NURSE^NANCY
||||||222222^PHYSICIAN^^^^DR|||||||MB|F|||||||444642&ROSCOP&Mike^200309081130
ORC|SC|12345670^Emergency||777^Emergency|CM||||200309060818||||||||||||Emergency
Ward^^^^^^FI^^^EW00
OBX|1|CE|32761-9^Leukocytes^LN||value|||N|||F|||200309060830
OBX|2|CE|32762-7^Epithelial Cells^LN||value|||N|||F|||200309060830|
|333231^BACK^TERRY
OBX|3|CE|20430-5^Culture^LN||POS^Positive^L|||N|||F|||200309070935|…
|333231^BACK^TERRY
OBR|2|12345670^Emergency|PUS0300666^Micro|87072^Organism
Identification^CPT4|||||||||||| ||||||||MB|F|||||||444642&ROSCOP&Mike^200309081130
ORC|SC|12345685^Emergency||777^Emergency|CM||||200309070941|333231^BACK^TERRY||||||
|||||Emergency Ward^^^^^^FI^^^EW00
OBX|1|NM|21020-3^Micro organism identified^LN|1|Staph Aureus|||N|||F|
||200309080830|…
OBR|3|12345670^Emergency|PUS0300666^Micro|87186^Antibiotic
Susceptibility^CPT4|||||||||||| ||||||||MB|F|||||||444642&ROSCOP&Mike^200309081130
ORC|SC|12345686^Emergency||777^Emergency|CM||||200309070938|333231^BACK^TERRY||||||
|||||Emergency Ward^^^^^^FI^^^EW00
OBX|1|SN|18928-2^Gentamicin^LN|1|value|µg/ml||S|||F|||200309080830|…
OBX|2|SN|18996-9^Tobramycin^LN|1|value|µg/ml||R|||F|||200309080830|…
OBX|3|SN|18954-8^Netilmicin^LN|1|value|µg/ml||S|||F|||200309080830|…
OBX|4|SN|18959-7^Ofloxacin^LN|1|value|µg/ml||S|||F|||200309080830|…
OBX|5|SN|18917-5^Doxycycline^LN|1|value|µg/ml||S|||F|||200309080830|…
OBX|6|SN|19000-9^Vancomycin^LN|1|value|µg/ml||S|||F|||200309080830|…
OBX|7|SN|18974-6^Rifampicin^LN|1|value|µg/ml||S|||F|||200309080830|…
OBX|8|SN|25596-8^Fosfomycine^LN|1|value|µg/ml||S|||F|||200309080830|…
```

The related acknowledgement message isn't shown.

10 Relationship between Transactions and messages/trigger events

3100 The following tables list all the combinations of message types and trigger events that can be used by each Transaction on IHE Laboratory Framework.

OML, ORL and OUL message types use a primary trigger event stored in second component of MSH-9, which describes the message structure (O21, O22, O33, O34, O35, O36), and a secondary trigger event stored in ORC-1 (Order Control), which actually is the real world trigger event. The "Event type" column is formatted "primary event/secondary event". For these, the "Event type" column is formatted: primary event/secondary event.

For OUL message types the content of the field OBR-25 (Results Status) gives a precision on the global status of the results of the order. The values of this field are shown in an additional column in the tables for transaction LAB-3 and LAB-5.

3110 ADT message types use only the classical trigger event stored in second component of MSH-9.

Transaction RAD-1: Patient Registration

Transaction definition	Message type	Trigger event	Event type	HL-7 Ver2.5
Patient Registration	ADT	Inpatient/outpatient notice	A01	Chapter 3
		Registration of an outpatient patient	A04	
		Preadmission of an inpatient	A05	
		Cancel Admit Register Patient	A11	
		Cancel Preadmission of an inpatient	A38	

Transaction RAD-12: Patient Information Update

Transaction definition	Message type	Trigger event	Event type	HL-7 Ver2.5
Patient Information Update	ADT	Patient Transfer	A02	Chapter 3
		Patient Discharge	A03	
		Change an Outpatient to Inpatient	A06	
		Change an Inpatient to Outpatient	A07	
		Update Patient Information	A08	
		Canceling Patient Transfert	A12	
		Merge Patient	A40	

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Transaction LAB-1: Placer Order Management

Transaction definition	Message type	Trigger event	Event type	HL-7 Ver2.5
Placing a new order (OP -> OF)	OML	Laboratory Order Message (Battery Centric)	O21/NW	Chapter 4
		Laboratory Order for multiple orders related to a single specimen	O33/NW	
		Laboratory Order for multiple orders related to a single container of a specimen	O35/NW	
Application response to a new order message (OF -> OP)	ORL	General laboratory order response message to any OML	O22/OK O22/UA	
		Laboratory order response message to a multiple order related to a single specimen OML	O34/OK O34/UA	
		Laboratory order response message to a single container of a specimen OML	O36/OK O36/UA	
Order or battery canceled by Order Filler (OF -> OP)	OML	Laboratory Order Message (Battery Centric)	O21/OC	
		Laboratory Order for multiple orders related to a single specimen	O33/OC	
		Laboratory Order for multiple orders related to a single container of a specimen	O35/OC	
Order Placer application response to order or battery canceled by Order Filler (OP -> OF)	ORL	General laboratory order response message to any OML	O22/OK O22/UA	
		Laboratory order response message to a multiple order related to a single specimen OML	O34/OK O34/UA	
		Laboratory order response message to a single container of a specimen OML	O36/OK O36/UA	
Status Changed (OF -> OP)	OML	Laboratory Order Message (Battery Centric)	O21/SC	
		Laboratory Order for multiple orders related to a single specimen	O33/SC	
		Laboratory Order for multiple orders related to a single container of a specimen	O35/SC	
Application response to a status changes (OP -> OF)	ORL	General laboratory order response message to any OML	O22/OK O22/UA	
		Laboratory order response message to a multiple order related to a single specimen OML	O34/OK O34/UA	
		Laboratory order response message to a single container of a specimen OML	O36/OK O36/UA	
Order service replace request by Order Placer (OP -> OF)	OML	Laboratory Order Message (Battery Centric)	O21/RP	
		Laboratory Order for multiple orders related to a single specimen	O33/RP	
		Laboratory Order for multiple orders related to a single container of a specimen	O35/RP	
Order Filler application	ORL	General laboratory order response message to any OML	O22/RQ O22/UM	

Transaction definition	Message type	Trigger event	Event type	HL-7 Ver2.5
response to order service replace request by Order Placer (OF -> OP)		Laboratory order response message to a multiple order related to a single specimen OML	O34/RQ O34/UM	
		Laboratory order response message to a single container of a specimen OML	O36/RQ O36/UM	
Order replaced by Order Filler (OF -> OP)	OML	Laboratory Order Message (Battery Centric)	O21/RU	
		Laboratory Order for multiple orders related to a single specimen	O33/RU	
		Laboratory Order for multiple orders related to a single container of a specimen	O35/RU	
Order placer application response to order replaced by Order Filler (OP -> OF)	ORL	General laboratory order response message to any OML	O22/RQ O22/UM	
		Laboratory order response message to a multiple order related to a single specimen OML	O34/RQ O34/UM	
		Laboratory order response message to a single container of a specimen OML	O36/RQ O36/UM	
Cancel order request by Order Placer (OP -> OF)	OML	Laboratory Order Message (Battery Centric)	O21/CA	
		Laboratory Order for multiple orders related to a single specimen	O33/CA	
		Laboratory Order for multiple orders related to a single container of a specimen	O35/CA	
Order Filler application response to cancel request by Order Placer (OF -> OP)	ORL	General laboratory order response message to any OML	O22/CR O22/UC	
		Laboratory order response message to a multiple order related to a single specimen OML	O34/CR O34/UC	
		Laboratory order response message to a single container of a specimen OML	O36/CR O36/UC	

Transaction LAB-2: Filler Order Management

Transaction definition	Message type	Trigger event	Event type	HL-7 Ver2.5
Send order / service number request (OF -> OP)	OML	Laboratory Order Message (Battery Centric)	O21/SN	Chapter 4
		Laboratory Order for multiple orders related to a single specimen	O33/SN	
		Laboratory Order for multiple orders related to a single container of a specimen	O35/SN	
Acknowledgement to order / service number request (OP -> OF)	ORL	General laboratory order response message to any OML	O22/NA or O22/UA	
		Laboratory order response message to a multiple order related to a single specimen OML	O34/NA or O34/UA	
		Laboratory order response message to a single container of a specimen OML	O36/NA or O36/UA	

Transaction LAB-3: Order Results Management

Transaction definition	Message type	Trigger event	Event type	OBR-25 status	HL-7 Ver2.5
Reception of specimen(s) (no results available, procedure incomplete)	OUL	Unsolicited specimen oriented observation message	R22/SC	I	Chapter 7
		Unsolicited order oriented observation message	R24/SC	I	
Some or all of the results available Not validated yet.	OUL	Unsolicited specimen oriented observation message	R22/SC	R	
		Unsolicited order oriented observation message	R24/SC	R	
Preliminary: Some of results available, validated.	OUL	Unsolicited specimen oriented observation message	R22/SC	P	
		Unsolicited order oriented observation message	R24/SC	P	
Final: All results available, validated	OUL	Unsolicited specimen oriented observation message	R22/SC	F	
		Unsolicited order oriented observation message	R24/SC	F	
Correction of final results results	OUL	Unsolicited specimen oriented observation message	R22/SC	C	
		Unsolicited order oriented observation message	R24/SC	C	
Deletion of battery/test in a filler order (no results available)	OUL	Unsolicited specimen oriented observation message	R22/SC	X	
		Unsolicited order oriented observation message	R24/SC	X	
Addition of a battery/test in an order (but not done)	OUL	Unsolicited specimen oriented observation message	R22/SC	S	
		Unsolicited order oriented observation message	R24/SC	S	

Transaction LAB-4: Work Order Management

Transaction definition	Message type	Trigger event	Event type	HL-7 Ver2.5
Order Filler issues the new order (test request) (OF -> AM)	OML	Laboratory order message	O21/NW	Chapter 4
		Laboratory order for multiple orders related to a single specimen	O33/NW	
		Laboratory order for multiple orders related to a single container of a specimen	O35/NW	
Automation Manager responds to new order (AM -> OF)	ORL	General laboratory order response message to any OML	O22/OK O22/UA	
		Laboratory order response message to a multiple order related to single specimen OML	O34/OK O34/UA	
		Laboratory order response message to a single container of a specimen OML	O36/OK O36/UA	
Order Filler replaces the order (test request) (OF -> AM)	OML	Laboratory order message	O21/RP	
		Laboratory order for multiple orders related to a single specimen	O33/RP	
		Laboratory order for multiple orders related to a single container of a specimen	O35/RP	
Automation Manager responds to replace order (AM -> OF)	ORL	General laboratory order response message to any OML	O22/RQ O22/UM	
		Laboratory order response message to a multiple order related to single specimen OML	O34/RQ O34/UM	
		Laboratory order response message to a single container of a specimen OML	O36RQ O36UM	
Order Filler cancels the order (test request) (OF -> AM)	OML	Laboratory order message	O21/CA	
		Laboratory order for multiple orders related to a single specimen	O33/CA	
		Laboratory order for multiple orders related to a single container of a specimen	O35/CA	
Automation Manager responds to cancel order (AM -> OF)	ORL	General laboratory order response message to any OML	O22/CR O22/UC	
		Laboratory order response message to a multiple order related to single specimen OML	O34/CR O34/UC	
		Laboratory order response message to a single container of a specimen OML	O36/CR O36/UC	

Transaction LAB-5: Test Results Management

Transaction definition	Message type	Trigger event	Event type	OBR-25 status	HL-7 Ver2.5
Automation Manager transmits the reception of specimen(s) / container(s) (no results available, procedure incomplete)	OUL	Unsolicited Specimen Oriented Observation Message	R22/SC	I	Chapter 7
		Unsolicited Specimen Container Oriented Observation Message	R23/SC	I	
		Unsolicited Order Oriented Observation Message	R24/SC	I	
Automation Manager transmits some (or all) of the results not yet validated	OUL	Unsolicited Specimen Oriented Observation Message	R22/SC	R	
		Unsolicited Specimen Container Oriented Observation Message	R23/SC	R	
		Unsolicited Order Oriented Observation Message	R24/SC	R	
Automation Manager transmits the preliminary results (some of results available, validated) (AM -> OF)	OUL	Unsolicited Specimen Oriented Observation Message	R22/SC	P	
		Unsolicited Specimen Container Oriented Observation Message	R23/SC	P	
		Unsolicited Order Oriented Observation Message	R24/SC	P	
Automation Manager transmits the final results (all results available, validated)	OUL	Unsolicited Specimen Oriented Observation Message	R22/SC	F	
		Unsolicited Specimen Container Oriented Observation Message	R23/SC	F	
		Unsolicited Order Oriented Observation Message	R24/SC	F	
Automation Manager transmits the correction of final results	OUL	Unsolicited Specimen Oriented Observation Message	R22/SC	C	
		Unsolicited Specimen Container Oriented Observation Message	R23/SC	C	
		Unsolicited Order Oriented Observation Message	R24/SC	C	

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11 Outstanding issues

Value of ORC-1 Order Control in the OML message sent by the Order Filler to the Order Placer to accept an order in transaction LAB-1 : According to HL7 v2.5 table 0119, "OK" doesn't seem to be a valid value for an OML message, and "RR" is only left for backward compatibility. Therefore the value "SC" (status changed) has been chosen. This has to be confirmed. Likewise, "UA" (unable to accept) doesn't seem to be a valid value for an OML message.

How to represent in HL7 v2.5, the three responsibilities defined in the data model, in a standard way, common to all countries?

The ADT transactions are already defined in Radiology Technical Framework using HL7 version 2.3.1, and are adopted without change by Laboratory Technical Framework. This framework adopts HL7 version 2.5, which may raise some incompatibility issues.

The results enquiry notification from the Order Result Tracker to the Order Filler is postponed to a later version of this Technical Framework for the following reasons: This event is supposed to be audited in the Order Result Tracker. There is no existing trigger event in HL7 v2.5 that meets this requirement.

For next cycle, two fields should be added: Equipment Instance Identifier (OBX-18) and Reagent Lot Number.

This cycle does not address the transmission of Laboratory global reports in specific format (pdf, rtf, txt). The intention is to enable products that will implement the Order Filler to also support an Information Source actor for the Retrieve Information For Display profile. Several solutions (specific ORC/OBR, MDM messages of HL7 2.5 chapter 9, …) are available to convey the RID reference but are to be studied.

