

Integrating the Healthcare Enterprise



5 **IHE Pathology and Laboratory Medicine (PaLM)  
Technical Framework**

10 **Volume 2x  
(PaLM TF-2x)  
Appendices**

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**Revision 10.0 - Final Text  
August 20, 2019**

25

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## 1 Introduction

165 This document, Volume 2x of the IHE Pathology and Laboratory Medicine (PaLM) Technical Framework, contains the Volume 2 Appendices.

### 1.1 Introduction to IHE

170 Integrating the Healthcare Enterprise (IHE) is an international initiative to promote the use of standards to achieve interoperability among health information technology (HIT) systems and effective use of electronic health records (EHRs). IHE provides a forum for care providers, HIT experts and other stakeholders in several clinical and operational domains to reach consensus on standards-based solutions to critical interoperability issues.

175 The primary output of IHE is system implementation guides, called IHE Profiles. IHE publishes each profile through a well-defined process of public review and trial implementation and gathers profiles that have reached final text status into an IHE Technical Framework, of which this volume is a part.

For more general information regarding IHE, refer to [www.ihe.net](http://www.ihe.net). It is strongly recommended that, prior to reading this volume, the reader familiarizes themselves with the concepts defined in the *IHE Technical Frameworks General Introduction*, which is published on [this page](#).

### 1.2 Intended Audience

180 The intended audience of IHE Technical Frameworks Volume 2 is:

- IT departments of healthcare institutions
- Technical staff of vendors participating in the IHE initiative
- Experts involved in standards development

### 1.3 Overview of Technical Framework Volume 2x

185 Volume 2x is comprised of several distinct sections:

- Section 1 provides background and reference material.
  - Section 2 presents the conventions used in this volume to define the transactions.
  - Appendix G defines Pathology and Laboratory Medicine transactions in detail, specifying the roles for each actor, the standards employed, the information exchanged, and in some cases, implementation options for the transaction.
- 190

The additional appendices in Volume 2x provide clarification of technical details of the IHE data model and transactions.

195 A glossary of terms and acronyms used in the IHE Technical Framework, including those from relevant standards, is provided in the *IHE Technical Framework General Introduction*, which is published on [this page](#).

Due to the length of the document, some domains divide Volume 2 into smaller volumes labeled 2a, 2b, etc. In this case, the Volume 2 appendices are gathered in Volume 2x. Code and message samples may also be stored on the IHE ftp server. In this case, explicit links to the ftp server will be provided in the transaction text.

## 200 **1.4 Comment Process**

IHE International welcomes comments on this document and the IHE initiative. They can be submitted by sending an email to the co-chairs and secretary of the Pathology and Laboratory Medicine domain committees at [palm@ihe.net](mailto:palm@ihe.net).

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250 **1.8 History of Document Changes**

This section provides a brief summary of changes and additions to this document.

Date	Document Revision	Change Summary
July 2016	7.0	Adoption of IHE_TF_Template_Vol2_Rev1.0_2014-07-01, Incorporation of the LAW Profile “Final Text”, Update of the LDA Profile by removal of the transactions transferred to LAW. Incorporation of option “labels & containers delivered” for the LBL Profile. Reorganization of Vol 2 content in 4 volumes: - 2a contains LTW and LDA transactions, - 2b contains LAW transactions and specific appendices, - 2c contains LBL, LPOCT and LCSD transactions - 2x contains common appendices
June 2017	8.0	- (CP 253) - Field OBR-10 illustrated in example 3.5.3.1 (CP 254)
August 2018	9.0	- Transitions of OBX-11 - OBR-25 - ORC-5 (integration of CP 256) - Added Appendix F (moved from Volume 2a, Appendix A) - Changed document title from <i>Transactions</i> to <i>Appendices</i> - Section 3 retitled to Appendix G
August 2019	10.0	Republished with minor edits.



## 2 Conventions

255 This document has adopted the following conventions for representing the framework concepts and specifying how the standards upon which the IHE Technical Framework is based shall be applied.

### 2.1 Transaction Modeling and Profiling Conventions

In order to maintain consistent documentation methods, modeling methods for IHE transactions and profiling conventions for frequently used standards as maintained as [Appendix E](#) to the *IHE Technical Frameworks General Introduction*.

260 Methods described include the Unified Modeling Language (UML) and standards conventions include DICOM<sup>®2</sup>, HL7 v2.x, HL7 CDA<sup>®3</sup>, etc. These conventions are critical to understanding this volume and should be reviewed prior to reading this text.

In addition, this same Appendix E provides:

- the network guidelines to be applied for HL7 v2.x messaging (see Section E.3.2.1) ;
- 265 • the message control for HL7 v2.x messaging, and the common definition of the MSH segment (see Section E.3.2.2) ;
- the acknowledgement modes for HL7 v2.x, and the common definition of the related segments MSA and ERR (see Section E.3.2.3) ;
- 270 • the message granularity, which states that there should be as many messages as trigger events, in other words, one trigger event and one business object per message (see Section E.3.2.5);
- the empty field convention (“NULL value) for HL7 v2.x messaging (see Section E.3.2.6).

### 2.2 Additional Standards Profiling Conventions used by PaLM TF

275 This section defines profiling conventions for standards which are not described in the *IHE Technical Frameworks General Introduction, Appendix E* and which are applied by the transactions of the Pathology and Laboratory Medicine Technical Framework, unless otherwise specified.

#### 2.2.1 Simplified convention for HL7 v2.x message static definition

280 For readability and brevity reasons, HL7 v2.x message static definitions of the Pathology and Laboratory Medicine Technical Framework may omit the “not supported segments” (segments marked with usage “X”).

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<sup>2</sup> DICOM is the registered trademark of the National Electrical Manufacturers Association for its standards publications relating to digital communications of medical information.

<sup>3</sup> CDA is the registered trademark of Health Level Seven International.

285 HL7 v2.x message static definitions of the Pathology and Laboratory Medicine Technical Framework show in their leftmost column “*Segment*” the optionality and repeatability of message segments as they appear in the base standard, respectively represented by square brackets and curly braces. The reader must be aware that the “Usage” and “Card.” Columns on the right bring further constraints specified by the IHE static definition, which may restrict these base standard optionality and repeatability.

### 2.2.2 Simplified convention for HL7 v2.x segment static definition

290 For readability and brevity reasons, HL7 v2.x segment static definitions of the Pathology and Laboratory Medicine Technical Framework may omit the “optional fields” (fields marked with usage “O”).

### 2.2.3 HL7 v2.x Acknowledgement mode applied in the PaLM TF

295 Except otherwise specified, applications implementing transactions of the IHE Pathology and Laboratory Medicine Technical Framework based on HL7 v2.x messages, use the HL7 original acknowledgement mode.

An OML message shall be acknowledged by one single ORL message. An OUL or an ORU message shall be acknowledged by one single ACK message.

300 Nevertheless, 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.

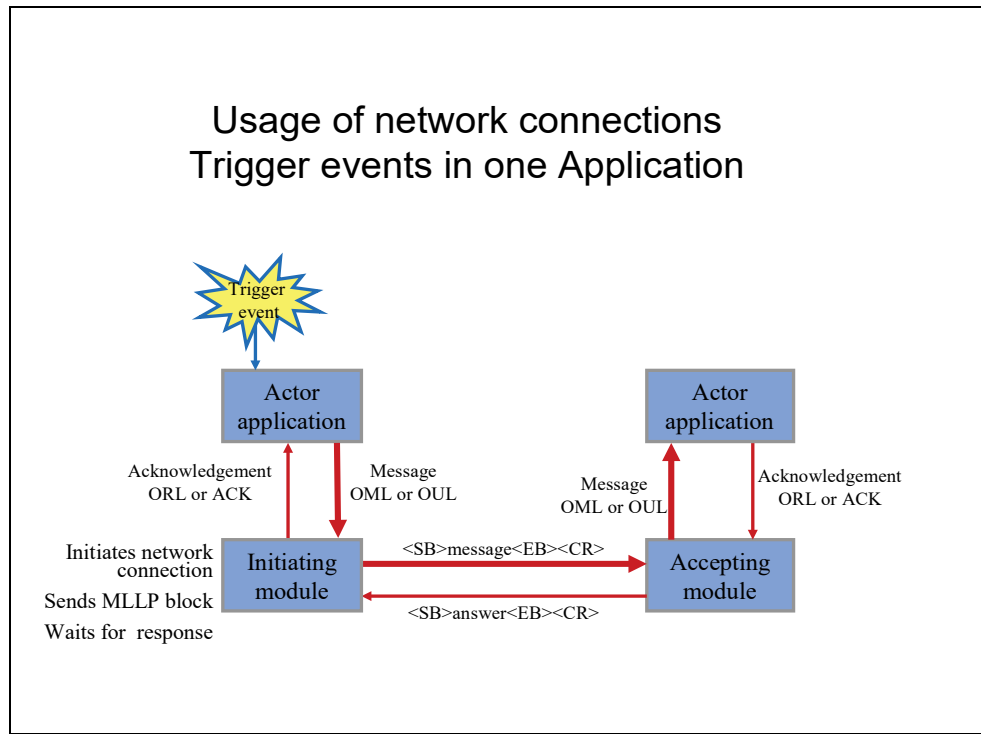
### 2.2.4 HL7 v2.x Acknowledgement policies applied in the PaLM TF

305 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.

310 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.

315 The acknowledgement message is an application-level acknowledgement. The application acknowledgement shall only be created by an application that is able to examine a message at the semantic / business-process level. Intermediate message brokers do not have this capacity and therefore shall not be used to generate the contents of application acknowledgements.



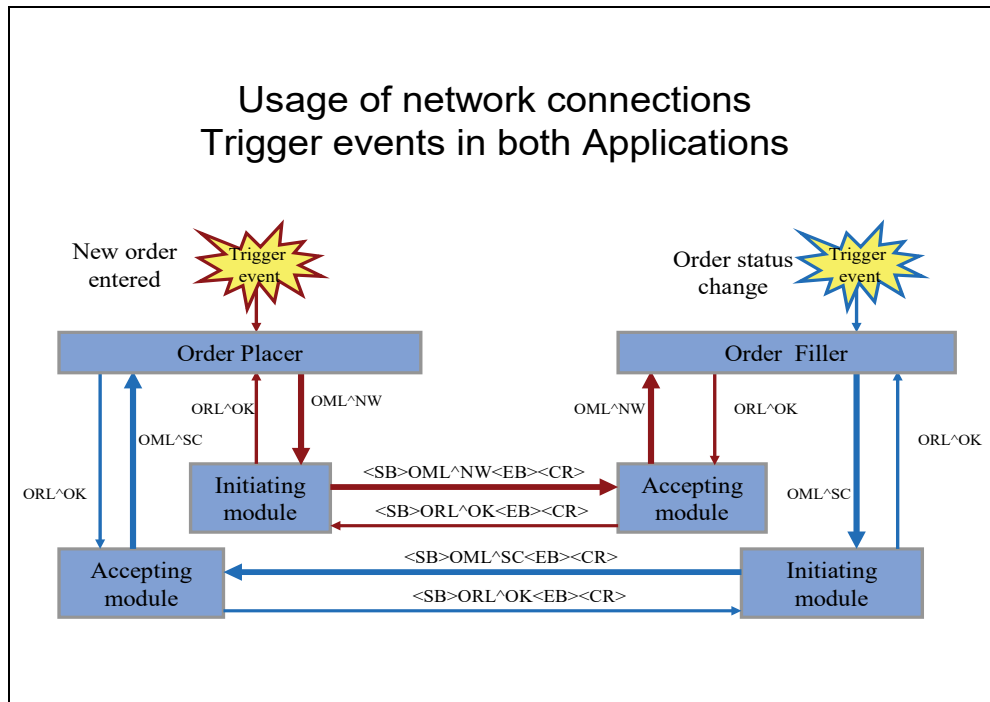
320

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

325

330

335



### 2.3 Use of Coded Entities and Coding Schemes

340 Where applicable, coding schemes required by the DICOM, HL7, LOINC, and SNOMED  
standards are used in IHE Profiles. In the cases where such resources are not explicitly identified  
by standards, implementations may utilize any resource (including proprietary or local) provided  
any licensing/copyright requirements are satisfied.

345 IHE does produce and maintain certain terminology. OIDs and URNs have been assigned for  
specific uses. The IHE process for managing OIDs and URNs is described at  
[http://wiki.ihe.net/index.php/OID\\_Registration](http://wiki.ihe.net/index.php/OID_Registration).

# Appendices

## Appendix A – HL7 v2.x Common Data Types

### A.1 CX – Extended Composite ID with Check Digit

350 Except otherwise specified this data type is constrained in transactions of the PaLM Technical Framework, as shown below:

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

### A.2 EI – Entity Identifier

355 Except otherwise specified this data type is constrained in transactions of the PaLM Technical Framework, as shown below:

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

Condition predicate: Either component 2 or both components 3 and 4 are required. Components 2, 3 and 4 may be all present.

360 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

365 Example 2: AB12345^^1.2.840.45.67^ISO

Example 3: AB12345^RiversideHospital^1.2.840.45.67^ISO

### A.3 EIP – Entity Identifier Pair

The usage of this data type in the context of transactions [LAB-27], [LAB-28] and [LAB-29] is specified in Volume 2b.

370 For other transactions, this data type is constrained in transactions of the PaLM Technical Framework, as shown below:

SEQ	LEN	DT	Usage	CARD	TBL #	COMPONENT NAME
1	427	EI	C	[0..1]		Placer Assigned Identifier
2	427	EI	C	[0..1]		Filler Assigned Identifier

375 This data type is used for identifying specimens (SPM-2, SPM-3), order groups (ORC-4) and parent orders (OBR-29).

The usage depends upon the kind of object identified, and upon the transaction carrying this object:

For specimens:

- In the context of transactions [LAB-1], [LAB-2], [LAB-3]:
  - 380 • EIP-1 is populated with the specimen ID assigned by the Order Placer, if available.
  - EIP-2 is populated with the specimen ID assigned by the Order Filler, if available.
- In the context of transactions [LAB-4] and [LAB-5]:
  - EIP-1 is populated with the specimen ID assigned by an actor preceding the Automation Manager in the workflow, if available.
  - 385 • EIP-2 is populated with the specimen ID assigned by the Automation Manager or by a Laboratory Device, if available.
- In the context of transactions [LAB-21], [LAB-22], [LAB-26]:
  - EIP-1 is populated with the specimen ID assigned by an actor preceding the Laboratory Device, if available.
  - 390 • EIP-2 is populated with the specimen ID assigned by a Laboratory Device, if available.
- In the context of transactions [LAB-61] and [LAB-62]:
  - EIP-1 is populated with the specimen ID assigned by the Label Information Provider.
  - EIP-2 is never populated.

395 For order groups (ORC-4) and parent orders (OBR-29), EIP-1 is populated with the identifier assigned by the Order Placer application, if known, and EIP-2 is populated with the identifier accessioned by the Order Filler application, if known.

#### A.4 HD – Hierarchic Designator

Except otherwise specified this data type is constrained in transactions of the PaLM Technical Framework, as shown below:

400

SEQ	LEN	DT	Usage	CARD	TBL #	COMPONENT NAME
1	20	IS	R	[1..1]	0300	Namespace ID
2	199	ST	C			Universal ID
3	6	ID	C		0301	Universal ID Type

Condition predicate: Data Type HD is populated with:

- Either the first component “Namespace ID” alone, which in this case contains a local identifier of the object.
- 405 - Or with all three components, “Namespace ID” containing the name of the object, “Universal ID” containing its universal OID, and “Universal ID Type” containing the value **ISO**.



## **Appendix B – <Place Holder>**

Left blank intentionally.

410 **Appendix C – Common HL7 Message Segments**

This section describes the common HL7 v2.x message segments used by transaction of the PaLM Technical Framework.

Each table represents a segment. Below the table are commented only the fields for which the 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 technical framework.

415

**C.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.

420

**Table C.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	[0..1]	0399	00017	Country Code
18	16	ID	C	[0..1]	0211	00692	Character Set
19	250	CE	RE	[0..1]		00693	Principal Language of Message
20	20	ID	C	[0..1]	0356	01317	Alternate Character Set Handling Scheme
21	427	EI	RE	[0..*]		01598	Message Profile Identifier

**MSH-1 Field Separator (SI)**, required.

The Pathology and Laboratory Medicine Technical Framework requires that applications support HL7-recommended value that is | (ASCII 124).

425 **MSH-2 Encoding Characters (ST)**, 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).

430 **MSH-4 Sending Facility (HD)**, required.

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

The Pathology and Laboratory Medicine Technical Framework requires that this field be populated with:

435 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.

440 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 Pathology and Laboratory Medicine Technical Framework requires that this field be populated with:

445 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.

450 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)>

455 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.**

460 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-11 Processing ID (PT), required.**

Components: <Processing ID (ID)> ^ <Processing Mode (ID)>

465 HL7 definition: This field indicates whether to process a message as defined in HL7 Application (level 7) Processing rules.

This Pathology and Laboratory Medicine Technical Framework mandates only the first component, with permitted values listed in HL7 table 0103 – Processing ID:

**HL7 Table 0103 - Processing ID**

Value	Meaning	Comment
D	Debugging	
P	Production	
T	Training	

470

**MSH-12 Version ID (VID), required.**

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

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

The Pathology and Laboratory Medicine Technical framework requires the first component to be populated with a value starting with the character string "2.5" representing HL7 major release 2.5. Later minor releases of this 2.5, like the current release 2.5.1, are also supported by the Technical Framework.

480 Valid examples: |2.5| |2.5.1|

**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.

485 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:

490 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:

495 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.

500 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.

505 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.

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

**MSH-20 Alternate Character Set Handling Scheme (ID)**, conditional.

515 HL7 definition: When any alternative character sets are used (as specified in the second or later iterations of MSH-18 character sets), and if any special handling scheme is needed, this component is to specify the scheme used, according to HL7 Table 0356- Alternate character set handling scheme as defined below:

**HL7 Table 0356 - Alternate Character Set Handling Scheme**

Value	Description	Comment
ISO 2022-1994	This standard is titled "Information Technology - Character Code Structure and Extension Technique". .	This standard specifies an escape sequence from basic one byte character set to specified other character set, and vice versa. The escape sequence explicitly specifies what alternate character set to be evoked. Note that in this mode, the actual ASCII escape character is used as defined in the referenced ISO document. As noted in 1.7.1, escape sequences to/from alternate character set should occur within HL7 delimiters. In other words, HL7 delimiters are basic one byte characters only, and just before and just after delimiters, character encoding status should be the basic one byte set.
2.3	The character set switching mode specified in HL7 2.5, section 2.7.2, "Escape sequences supporting multiple character sets" and section 2.A.46, "XPN – extended person name".	Note that the escape sequences used in this mode do not use the ASCII "esc" character, as defined in ISO 2022-1994. They are "HL7 escape sequences" as first defined in HL7 2.3, sec. 2.9.2. (Also, note that sections 2.8.28.6.1 and 2.9.2 in HL7 2.3 correspond to sections 2.16.93 and 2.7.2 in HL7 2. 5.)
<null>	This is the default, indicating that there is no character set switching occurring in this message.	This is the default.

Condition predicate: This field shall be valued for messages using more than one character set.

Example of HL7 messages in Japan:

520 **MSH-21 Message Profile Identifier (EI)**, required if available.

For the Pathology and Laboratory Medicine 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 Profile constraints is only allowed in national extensions to this framework.

525

## C.2 NTE – Notes and Comment Segment

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

This segment is used for sending notes and comments.

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

530

**Table C.2-1: 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.

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

535

**Table C.2-2: 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 or Analyzer Manager is the source of the comment	
Z	Analyzer 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 a NULL value.

540 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 segments SHALL be used exclusively for comments and notes intended for humans. Contents of NTE 3 SHALL be considered as not interpretable by a machine.

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

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

**Table C.2-3: 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.

### C.3 PID – Patient Identification Segment

HL7 v2.5: chapter 3 (3.4.2)

550 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 C.3-1: 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



555 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 Date/Time of Birth (TS)**, required if known.

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 Patient Account Number (CX)**, required if known.

560 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 Technical Framework.

**PID-35 Species Code (CE), PID-36 Breed Code (CE)**, conditional.

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

## 565 C.4 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 C.4-1: 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]	<a href="#">0116</a>	00170	Bed Status
51	1	IS	C	[0..1]	0326	01226	Visit Indicator
52	250	XCN	X	[0..0]	0010	01274	Other Healthcare Provider

570

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 Technical Framework.

575 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'.

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

### C.5 ORC – Common Order Segment

HL7 v2.5: chapter 4 (4.5.1). The ORC and OBR segments contain a number of duplicate fields. The Technical Framework is defined in 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.

585

**Table C.5-1: 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		EIP	RE	[0..1]		00218	Placer Group Number
5	2	ID	C	[0..1]	0038	00219	Order Status
6	1	ID	O	[0..1]	0121	00220	Response Flag
7	200	TQ	X	[0..0]		00221	Quantity/Timing
8	200	EIP	C	[0..1]		00222	Parent
9	26	TS	R	[1..1]		00223	Date/Time of Transaction
10	250	XCN	O	[0..*]		00224	Entered By
11	250	XCN	O	[0..*]		00225	Verified By
12	250	XCN	O	[0..1]		00226	Ordering Provider
13	80	PL	O	[0..1]		00227	Enterer's Location
14	250	XTN	O	[0..2]		00228	Call Back Phone Number
15	26	TS	O	[0..1]		00229	Order Effective Date/Time
16	250	CE	O	[0..1]		00230	Order Control Code Reason
17	250	CE	C	[0..1]		00231	Entering Organization
18	250	CE	O	[0..1]		00232	Entering Device
19	250	XCN	O	[0..*]		00233	Action By
20	250	CE	X	[0..0]	0339	01310	Advanced Beneficiary Notice Code
21	250	XON	O	[0..1]		01311	Ordering Facility Name
22	250	XAD	O	[0..1]		01312	Ordering Facility Address
23	250	XTN	O	[0..1]		01313	Ordering Facility Telephone Number
24	250	XAD	O	[0..1]		01314	Ordering Provider Address
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
28	250	CWE	O	[0..1]		00615	Confidentiality Code
29	250	CWE	RE	[0..1]		01643	Order Type

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
30	250	CNE	O	[0..1]		01644	Enterer Authorization Mode
31	250	CWE	X	[0..1]		02286	Parent Universal Service Identifier

**ORC-1 Order Control (ID), required.**

590 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 Technical Framework allows only the following subset:

**Subset of HL7 table 0119 – Order Control Codes Supported by IHE**

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, ORU 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).
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.
PR	“Previous results with new order/service”. Used in [LAB-1], [LAB-4], [LAB-21] and [LAB-22] to provide some previous results with the order or work order or wok order step that is requested by the sender.

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

595 The Placer Order Number (ORC-2, OBR-2) is local to the transaction: In transactions [LAB-1], [LAB-2], [LAB-3] it is a number assigned to the Order by the Order Placer. In transactions [LAB-4], [LAB-5] it is a number assigned to the Work Order by the Order Filler. In transactions [LAB-21], [LAB-22], [LAB-23] it is a number assigned to the WOS (Work Order Step) by the Automation Manager.

600 Condition predicate: if the field is valued then its value shall match the value of the required field OBR-2.

**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.

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

The data type of ORC-4 is upgraded from EI to EIP, in pre-adoption of HL7 2.8.

The Placer Group Number represents an identification of a set of closely related orders, i.e., a list of batteries and tests ordered together by the placer to the laboratory for one subject, known as an **Order Group**. This field carries the Order Group identification, which is a pair of identifiers.

610 The first identifier, if present, is assigned by the Order Placer application. The second identifier, if present, is assigned by the Order Filler application.

An Order Group may be identified by the order placer or by the order filler or by both applications. The Order Group consists of all the ORCs and order detail segments sharing the same Order Group identification.

615 In cases laboratory orders are not grouped under a common Order Group this field is empty.

The Order Group identification is constant throughout the laboratory workflow once the Order Group has been accepted and registered in the Order Filler application. From that point the content of this field (one or two identifiers) should be constant across all messages related to an Order Group, circulating between Order Placer, Order Filler, Order Result Tracker, Automation Manager, Pre/post-processor, Analyzer Manager, Analyzer, Label Broker, Label Information Provider.

620 **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.

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

**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	

630 Note: For the conditions of use of these values, please read Section C.10 in Appendix C “Correlations of status between ORC, OBR and OBX”.

**ORC-6 Response Flag (ID)**, optional.

The Pathology and Laboratory Medicine Technical Framework does not constrain the usage of this field.

635 **ORC-7 Quantity/Timing (TQ)**, not supported.

The Pathology and Laboratory Medicine Technical Framework does not support this field.

**ORC-8 Parent (EIP)**, conditional.

HL7 definition: This field relates a child to its parent when a parent-child relationship exists.

640 In this Technical Framework this field is used in the context of microbiology orders, in transactions [LAB-2] and [LAB-3]. The Order Filler uses this field to specify the parent order from which a child order was generated on the laboratory side.

Condition predicate: If this field is valued, its content must be the same as the content of OBR-29.

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

645 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", this field contains the date/time of the last status change of the unit of work (ORC-5).

650 **ORC-10 Entered By (XCN)**, optional.

HL7 definition: This field contains the identity of the person who actually keyed the request into the application. Note that this refers to the current transaction as reflected in ORC-1 Order Control Code. It provides an audit trail in case the request is entered incorrectly and the ancillary department needs to clarify the request. By local agreement, either the ID number or name component may be omitted.

The Technical Framework does not constrain the usage of this field.

For a new order placed (ORC-1="NW"), the field specifies the person who typed the order on the Order Placer application.

**ORC-11 Verified By (XCN), optional.**

660 HL7 definition: This field contains the identity of the person who verified the accuracy of the entered request. Note that this refers to the current transaction as reflected in ORC-1 Order Control Code. It is used in cases where the request is entered by a technician and needs to be verified by a higher authority (e.g., a nurse). By local agreement, either the ID number or name component may be omitted.

665 The Technical Framework does not constrain the usage of this field.

**ORC-12 Ordering Provider (XCN), optional.**

HL7 definition: This field contains the identity of the person who is responsible for creating the request (i.e., the ordering physician).

If the field is valued then its value has to match the value of the required field OBR-16.

670 **ORC-13 Enterer's Location (PL), optional.**

HL7 definition: This field specifies the location (e.g., nurse station, ancillary service location, clinic, floor) where the person who entered the request was physically located when the order was entered. Note that this refers to the current transaction as reflected in ORC-1 Order Control Code. Only those subcomponents relevant to enterer's location should be valued (commonly nursing unit; facility; building; floor). The person who entered the request is defined in ORC-10-  
675 entered by.

The Technical Framework does not further constrain the usage of this field, which contains location that is geographic data, not organizational data, as opposed to ORC-17.

680 For a new order placed (ORC-1="NW"), the field specifies the location where this order was typed on the Order Placer application.

**ORC-14 Callback Phone Number (XTN), optional.**

HL7 definition: This field contains the telephone number to call for clarification of a request or other information regarding the order.

685 Up to two phone numbers can be stored in this field. If the field is valued then its value has to match the value of field OBR-17.

**ORC-15 Order Effective Date/Time (TS), optional.**

HL7 definition: This field contains the date/time that the changes to the request took effect or are supposed to take effect.

690 If the field is left empty, its value is assumed to be equal to that specified in ORC-9-date/time of transaction or MSH-7-date/time of message if the transaction date/time is empty.

The Technical Framework does not constrain the usage of this field.

**ORC-16 Order Control Code Reason (CE), optional.**

HL7 definition: This field contains the explanation (either in coded or text form) of the reason for the order event described by the order control code (HL7 Table 0119).

695 The Technical Framework does not constrain the usage of this field.

**ORC-17 Entering Organization (CE), conditional.**

HL7 definition: This field identifies the organization that the enterer belonged to at the time he/she enters/maintains the order, such as medical group or department. The person who entered the request is defined in ORC-10 -entered by.

700 IHE Condition predicate:

This field represents the medical organization or team (e.g., the cardiology department) who places a new order.

It should be provided by the Order Placer in OML messages carrying new orders (ORC-1="NW") sent to the Order Filler, over transaction [LAB-1].

705 It should be propagated by the Order Filler in all messages related to this order, sent to the Automation Manager over transaction [LAB-4] as well as to the Order Result Tracker over transaction [LAB-3].

**ORC-18 Entering Device (CE), optional.**

HL7 definition: This field identifies the physical device (terminal, PC) used to enter the order.

710 The Technical Framework does not constrain the usage of this field.

**ORC-19 Action By (XCN), optional.**

HL7 definition: This field contains the identity of the person who initiated the event represented by the corresponding order control code. For example, if the order control code is CA (cancel order request), this field represents the person who requested the order cancellation. This person is typically a care provider but may not always be the same as ORC-12 ordering provider.

715

The Technical Framework does not constrain the usage of this field.

**ORC-20 Advanced Beneficiary Notice Code (CE), optional.**

HL7 definition: This field indicates the status of the patient's or the patient's representative's consent for responsibility to pay for potentially uninsured services.

720 The Technical Framework does not constrain the usage of this field.

**ORC-21 Ordering Facility Name (XON), optional.**

HL7 definition: This field contains the name of the facility placing the order.

The facility (hospital, clinic, institution) placing the order shall be represented with at least these three components: 1st = Organization name. 7th = Identifier Type Code with the value "FI", which means "Facility ID" as stated by HL7 table n° 0203. 10th = Organization Identifier.

725

**ORC-22 Ordering Facility Address (XAD), optional.**

HL7 definition: This field contains the address of the facility placing the order.

The Technical Framework does not constrain the usage of this field.

**ORC-23 Ordering Facility Phone Number (XTN), optional.**

730 HL7 definition: This field contains the telephone number of the facility placing the order.

The Technical Framework does not constrain the usage of this field.

**ORC-24 Ordering Provider (XAD), optional.**

HL7 definition: This field contains the address of the care provider requesting the order.

The Technical Framework does not constrain the usage of this field.

735 **ORC-25 Order Status Modifier (CWE), optional.**

HL7 definition: This field is a modifier or refiner of the ORC-5-Order status field. This field may be used to provide additional levels of specificity or additional information for the defined order status codes. Unlike the Order Status field, which is controlled by an HL7 defined table, this field is a CE data type allowing applications to support an unlimited library of Order Status Modifier codes.

740

The Technical Framework does not constrain the usage of this field.

**ORC-26 Advanced Beneficiary Notice Override Reason (CWE), optional.**

HL7 definition: This field contains the reason why the patient did not sign an Advanced Beneficiary Notice. The reason may be coded or it may be a free text entry.

745 The Technical Framework does not constrain the usage of this field.

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

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

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

750 **ORC-28 Confidentiality Code (CWE), optional.**

HL7 definition: This field contains information about the level of security and/or sensitivity surrounding the order (e.g., highly sensitive, not sensitive, sensitive, etc.).

The Technical Framework does not constrain the usage of this field.

**ORC-29 Order Type (CWE), required, may be empty.**

755 HL7 definition: This field indicates whether the order is to be executed in an inpatient setting or an outpatient setting. If this field is not valued, the system default is assumed. Refer to HL7 Table 0482 – Order Type for suggested values:



**HL7 Table 0482 - Order Type**

Value	Description	Comment
I	Inpatient Order	
O	Outpatient Order	

760 Field ORC-29 enables to distinguish between orders related to inpatient activity or outpatient activity, independently of the real situation of the patient expressed in PV1. This field should be populated if known in messages sent by the Order Placer to the Order Filler, and propagated by the latter to the Automation Manager and to the Order Result Tracker.

**ORC-30 Enterer Authorization Mode (CNE)**, optional.

765 HL7 definition: This field indicates the form of authorization a recorder had from the responsible practitioner to create or change an order.

The Technical Framework does not constrain the usage of this field.

**ORC-31 Parent Universal Service Identifier (CWE)**, not supported.

770 This field contains the identifier code for the parent order, which caused this observation/test/battery to be performed. Its content is the same as the one of OBR-50  
 ORC-31 and OBR-50 will be deprecated in version 2.7 of the standard.

## C.6 TQ1 – Timing Quantity Segment

HL7 v2.5: chapter 4 (4.5.4)

**Table C.6-1: TQ1 - Timing Quantity Segment**

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
7	26	TS	C	[0..1]		01633	Start date/time
9	250	CWE	R	[1..1]	0485	01635	Priority
12	10	ID	X	[0..0]	0427	01638	Conjunction

775

The IHE Technical Framework does not use TQ2 segment, and uses only one occurrence of TQ1 segment.

**TQ1-7 Start date/time (TS)**, conditional.

780 HL7 definition: This field may be specified by the requester, in which case it indicates the earliest date/time at which the services should be started. In many cases, however, the start date/time will be implied or will be defined by other fields in the service request record (e.g., urgency - STAT). In such a case, this field will be empty.

Condition predicate: This field is used in messages from the requester to the filler (Order Placer to Order Filler in [LAB-1], Order Filler to Automation Manager in [LAB-4], Automation

785 Manager to LD in [LAB-21] and [LAB-22]) in cases where the requester wants to enforce a starting date/time for the execution of the ordered tests.

As an example, if an order is placed with the specimen collection scheduled to be performed by a placer staff tomorrow morning, field TQ1-7 will be populated with this scheduled collection time so that the order filler knows that this order will not start until that time and no specimen is to be expected until then.

790

**TQ1-9 Priority (CWE)**, required.

This field defines the priority of the order. The values authorized by the Technical Framework are this subset of HL7 table 0485 - Priority codes:

**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.

795

Note: 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)**, not supported.

This field is conditional in HL7: It has to be valued only in case there is more than one TQ1 segment. As this IHE Framework restricts TQ1 to one single occurrence this field shall never be valued.

800

## C.7 SPM – Specimen Segment

HL7 v2.5: chapter 7 (7.4.3)

**Table C.7-1: SPM - Specimen Segment**

SEQ	LEN	DT	Usage	Card.	TBL #	ITEM#	Element name
1	4	SI	R	[1..1]		01754	Set ID – SPM
2	80	EIP	RE	[0..1]		01755	Specimen ID
3	80	EIP	RE	[0..*]		01756	Specimen Parent IDs
4	250	CWE	R	[1..1]	0487	01900	Specimen Type
5	250	CWE	O	[0..1]	0541	01757	Specimen Type Modifier
6	250	CWE	O	[0..*]	0371	01758	Specimen Additives

SEQ	LEN	DT	Usage	Card.	TBL #	ITEM#	Element name
7	250	CWE	RE	[0..1]	0488	01759	Specimen Collection Method
8	250	CWE	RE	[0..1]		01901	Specimen Source Site
9	250	CWE	RE	[0..*]	0542	01760	Specimen Source Site Modifier
10	250	CWE	RE	[0..1]	0543	01761	Specimen Collection Site
11	250	CWE	RE	[0..*]	0369	01762	Specimen Role
12	20	CQ	X	[0..0]		01902	Specimen Collection Amount
13	6	NM	X	[0..0]		01763	Grouped Specimen Count
14	250	ST	O	[0..*]		01764	Specimen Description
15	250	CWE	O	[0..*]	0376	01908	Specimen Handling Code
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
19	26	TS	O	[0..1]		01904	Specimen Expiration Date/Time
20	1	ID	C	[0..1]	0136	01766	Specimen Availability
21	250	CWE	C	[0..*]	0490	01767	Specimen Reject Reason
22	250	CWE	O	[0..1]	0491	01768	Specimen Quality
23	250	CWE	O	[0..1]	0492	01769	Specimen Appropriateness
24	250	CWE	O	[0..*]	0493	01770	Specimen Condition
25	20	CQ	O	[0..1]		01771	Specimen Current Quantity
26	4	NM	RE	[0..1]		01772	Number of Specimen Containers
27	250	CWE	C	[0..1]		01773	Container Type
28	250	CWE	O	[0..1]	0544	01774	Container Condition
29	250	CWE	O	[0..1]	0494	01175	Specimen Child Role

805 **SPM-1 Set ID – SPM (SI)**, required.

This field is used to identify SPM segment instances in messages where the SPM segment repeats. For the first (or only) occurrence of the segment, the sequence number is |1|; for the second occurrence, the sequence number is |2|; etc.

**SPM-2 Specimen ID (EIP)**, required if available.

810 This field contains a unique identifier or pair of unique identifiers for the specimen, enterprise-wide.

The transactions of profiles LAW and LBL use only the 1st component of data type EIP.

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

815 This field contains the identifier for the parent specimen, from which the specimen described by the segment instance has been extracted.

The transactions of profiles LAW and LBL use only the 1st component of data type EIP.

**SPM-4 Specimen Type (CWE), required.**

This field describes the precise nature of the entity that will be the source material for the observations. Valid coding systems for this field include HL7 table 0487 listed below, SNOMED CT, or any national coding scheme.

820

**HL7 Table 0487**

Value	Description	Comment
ABS	Abscess	
AMN	Amniotic fluid	
ASP	Aspirate	
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	

<b>Value</b>	<b>Description</b>	<b>Comment</b>
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	
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	

<b>Value</b>	<b>Description</b>	<b>Comment</b>
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)	
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	

Value	Description	Comment
WNDA	Wound abscess	
WNDE	Wound exudate	
WNDD	Wound drainage	

**SPM-5 Specimen Type Modifier (CWE), optional.**

825 This field contains modifying or qualifying description(s) about the specimen type whenever the vocabulary used in SPM-4 lacks precision.

**SPM-6 Specimen Additives (CWE), optional, repeatable.**

HL7 definition: This field identifies any additives introduced to the specimen before or at the time of collection. These additives may be introduced in order to preserve, maintain or enhance the particular nature or component of the specimen.

830 The Technical Framework has not constrained the usage of this field yet, other than adopting HL7 table 0371 for valid values:

**HL7 Table 0371 – Additive/Preservative**

Value	Description	Comment
F10	10% Formalin	Tissue preservative
C32	3.2% Citrate	Blue top tube
C38	3.8% Citrate	Blue top tube
HCL6	6N HCL	24 HR Urine Additive
ACDA	ACD Solution A	Yellow top tube
ACDB	ACD Solution B	Yellow top tube
ACET	Acetic Acid	Urine preservative
AMIES	Amies transport medium	Protozoa
HEPA	Ammonium heparin	Green top tube
BACTM	Bacterial Transport medium	Microbiological culture
BOR	Borate Boric Acid	24HR Urine Additive
BOUIN	Bouin's solution	Tissue
BF10	Buffered 10% formalin	Tissue
WEST	Buffered Citrate (Westergren Sedimentation Rate)	Black top tube
BSKM	Buffered skim milk	Viral isolation
CARS	Carson's Modified 10% formalin	Tissue
CARY	Cary Blair Medium	Stool Cultures
CHLTM	Chlamydia transport medium	Chlamydia culture
CTAD	CTAD (this should be spelled out if not universally understood)	Blue top tube

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Value	Description	Comment
ENT	Enteric bacteria transport medium	Bacterial culture
ENT+	Enteric plus	Stool Cultures
JKM	Jones Kendrick Medium	Bordetella pertussis
KARN	Karnovsky's fixative	Tissue
LIA	Lithium iodoacetate	Gray top tube
HEPL	Lithium/Li Heparin	Green top tube
M4	M4	Microbiological culture
M4RT	M4-RT	Microbiological culture
M5	M5	Microbiological culture
MICHTM	Michel's transport medium	IF tests
MMDTM	MMD transport medium	Immunofluorescence
HNO3	Nitric Acid	Urine
NONE	None	Red or Pink top tube
PAGE	Pages's Saline	Acanthoemba
PHENOL	Phenol	24 Hr Urine Additive
KOX	Potassium Oxalate	Gray top tube
EDTK	Potassium/K EDTA	Deprecated. Replaced by EDTK15 and EDTK75
EDTK15	Potassium/K EDTA 15%	Purple top tube
EDTK75	Potassium/K EDTA 7.5%	Purple top tube
PVA	PVA (polyvinylalcohol)	O&P
RLM	Reagan Lowe Medium	Bordetella pertussis cultures
SST	Serum Separator Tube (Polymer Gel)	'Tiger' Top tube
SILICA	Siliceous earth, 12 mg	Gray top tube
NAF	Sodium Fluoride	Gray top tube
FL100	Sodium Fluoride, 100mg	Urine
FL10	Sodium Fluoride, 10mg	Urine
NAPS	Sodium polyanethol sulfonate 0.35% in 0.85% sodium chloride	Yellow (Blood Culture)
HEPN	Sodium/Na Heparin	Green top tube
EDTN	Sodium/Na EDTA	Dark Blue top tube
SPS	SPS(this should be spelled out if not universally understood)	Anticoagulant w/o bacteriocidal properties
STUTM	Stuart transport medium	Bacterial culture
THROM	Thrombin	Orange or Grey/Yellow (STAT Chem)
FDP	Thrombin NIH; soybean trypsin inhibitor (Fibrin Degradation Products)	Dark Blue top tube
THYMOL	Thymol	24 Hr Urine Additive
THYO	Thyoglycollate broth	Bacterial Isolation
TOLU	Toluene	24 Hr Urine Additive



Value	Description	Comment
URETM	Ureaplasma transport medium	Ureaplasma culture
VIRTM	Viral Transport medium	Virus cultures

**SPM-7 Specimen Collection Method (CWE)**, required if available.

- 835 This field describes the procedure or process by which the specimen was collected. Valid coding systems for this field include HL7 table 0488 listed below, SNOMED CT, or any national coding scheme.

**HL7 Table 0488 – Specimen Collection Method**

Value	Description	Comment
FNA	Aspiration, Fine Needle	
PNA	Arterial puncture	
BIO	Biopsy	
BCAE	Blood Culture, Aerobic Bottle	
BCAN	Blood Culture, Anaerobic Bottle	
BCPD	Blood Culture, Pediatric Bottle	
CAP	Capillary Specimen	
CATH	Catheterized	
EPLA	Environmental, Plate	
ESWA	Environmental, Swab	
LNA	Line, Arterial	
CVP	Line, CVP	
LNV	Line, Venous	
MARTL	Martin-Lewis Agar	
ML11	Mod. Martin-Lewis Agar	
PACE	Pace, Gen-Probe	
PIN	Pinworm Prep	
KOFFP	Plate, Cough	
MLP	Plate, Martin-Lewis	
NYP	Plate, New York City	
TMP	Plate, Thayer-Martin	
ANP	Plates, Anaerobic	
BAP	Plates, Blood Agar	
PRIME	Pump Prime	
PUMP	Pump Specimen	
QC5	Quality Control For Micro	

Value	Description	Comment
SCLP	Scalp, Fetal Vein	
SCRAPS	Scrapings	
SHA	Shaving	
SWA	Swab	
SWD	Swab, Dacron tipped	
WOOD	Swab, Wooden Shaft	
TMOT	Transport Media,	
TMAN	Transport Media, Anaerobic	
TMCH	Transport Media, Chlamydia	
TMM4	Transport Media, M4	
TMMY	Transport Media, Mycoplasma	
TMPV	Transport Media, PVA	
TMSC	Transport Media, Stool Culture	
TMUP	Transport Media, Ureaplasma	
TMVI	Transport Media, Viral	
VENIP	Venipuncture	

840 **SPM-8 Specimen Source Site (CWE)**, required if available.

This field should be populated, particularly in microbiology, both in order and result messages when the specimen source site is known. Example: “EAR”.

**SPM-9 Specimen Source Site Modifier (CWE)**, required if available, repeatable.

845 This field should be populated, particularly in microbiology, both in order and result messages when the specimen source site modifier is known. Example: “LEFT” when the specimen has been collected from the left ear. More than one source site modifier maybe populated.

**SPM-10 Specimen Collection Site (CWE)**, required if available.

850 HL7 definition: This field differs from SPM-8-Specimen Source Site in those cases where the source site must be approached via a particular site (e.g., anatomic location). For example, in the case where a liver biopsy is obtained via a percutaneous needle, the collection site would be the point of entry of the needle. For venous blood collected from the left radial vein, the collection site could be “antecubital fossa”.

The Technical Framework leaves the usage of this field with no pre-specified vocabulary. HL7 user defined Table 0453 does not suggest any values.

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

The allowed values are listed in HL7 user defined table 0369, complemented by IHE:

**HL7 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 (human or other species)	
Q	Control specimen	
R	Replicate	
V	Verifying Calibrator, used for periodic calibration checks	
PSN	Human patient	added by IHE LAB TF, taken from HL7 V3 vocab
ANM	Animal	added by IHE LAB TF, taken from HL7 V3 vocab
MIC	Microorganism	added by IHE LAB TF, taken from HL7 V3 vocab
PLNT	Plant	added by IHE LAB TF, taken from HL7 V3 vocab
MAT	Material, non-living subject	added by IHE LAB TF, taken from HL7 V3 vocab

Restricted value sets:

- 860 Transactions [LAB-1], [LAB-2] and [LAB-3] deal with orders and results basically related to specimens collected from a patient and in some cases specimens collected from a non-person or even non-living subject (suspected rabid fox, spoiled water, rotten meat, isolated microorganism...) Therefore in these transactions, the only valid values are: “P” (patient, human or not), “PSN” (human patient), “ANM” (animal), “MIC” (microorganism subject), “PLNT” (vegetable subject), “MAT” (non-living subject e.g., air, water, instrument, food...)
- 865

Transactions [LAB-4] and [LAB-5] use the same value set as [LAB-1], [LAB-2] and [LAB-3], plus one extra value: “Q” (control specimen) used on Work Orders and results related to quality control specimens.

870 The other transactions of the Technical Framework using the SPM segment use the values in the table above, with no particular restriction.

**SPM-12 Specimen Collection Amount (CQ), not supported.**

HL7 definition: This field specifies the volume (quantity and units) of the collected specimen. The field has two components: <Quantity (NM)>^<Units (CE)>

The Technical Framework in its current release does not use this field.

875 In particular, the volume of a 24-hour urine specimen is carried in the OML message placing the Order (or the Work Order) as an observation in itself, using one or two OBX segments, as in the example below:

```
SPM|2|654_2^chemistry||UR|||||P|||||200310060735|200310060821||Y|||||1
OBX|1|NM|13362-9^URINE COLLECTION DURATION^LN||24|Hr|||||F|||200309060735
880 OBX|2|NM|19153-6^URINE SPECIMEN VOLUME^LN||980|ml|||||F|||200309060735
```

**SPM-13 Grouped Specimen Count (NM), not supported.**

The Technical Framework in its current release does not use this field, since none of its transaction deals with grouped specimens.

**SPM-14 Specimen Description (ST), optional.**

885 HL7 definition: This is a text field that allows additional information specifically about the specimen to be sent in the message.

In the LBL Profile, this field may be used to carry additional items of information about the specimen, which are not related to any other of the SPM fields, and which need to appear on the printed labels (i.e., particular specimen treatment requirements). The sender can produce as many instances of SPM-14 as there are information items to transfer to the label.

890

The Technical Framework has not constrained the usage of this field yet.

**SPM-15 Specimen Handling Code (CWE), optional, repeatable.**

HL7 definition: This field describes how the specimen and/or container need to be handled from the time of collection through the initiation of testing.

895 This field may be used in messages placing an Order (in [LAB-1]) or a Work Order (in [LAB-4]) or a Work Order Step (in [LAB-21] and [LAB-22]) as well as in messages carrying labeling instructions (in [LAB-61] and [LAB-62]).

The allowed values are listed in HL7 user defined table 0369, complemented by IHE:

**HL7 User-Defined Table 0376 – Specimen Handling Code**

Code	Description	Comment/Usage Note/Definition
C37	Body temperature	Critical to keep at body temperature: 36 - 38° C.

Code	Description	Comment/Usage Note/Definition
AMB	Ambient temperature	Keep at ambient (room) temperature, approximately 22 ± 2 degrees C. Accidental refrigeration or freezing is of little consequence
CAMB	Critical ambient temperature	Critical ambient – must not be refrigerated or frozen.
REF	Refrigerated temperature	Keep at refrigerated temperature: 4-8° C. Accidental warming or freezing is of little consequence
CREF	Critical refrigerated temperature	Critical refrigerated – must not be allowed to freeze or warm until immediately prior to testing
FRZ	Frozen temperature	Keep at frozen temperature: -4° C. Accidental thawing is of little consequence
CFRZ	Critical frozen temperature	Critical frozen – must not be allowed to thaw until immediately prior to testing
DFRZ	Deep frozen	Deep frozen: -16 to -20° C.
UFRZ	Ultra frozen	Ultra cold frozen: ~ -75 to -85° C. (ultra cold freezer is typically at temperature of dry ice).
NTR	Liquid nitrogen	Keep in liquid nitrogen.
PRTL	Protect from light	Protect from light (e.g., wrap in aluminum foil).
CATM	Protect from air	Critical. Do not expose to atmosphere. Do not uncap.
DRY	Dry	Keep in a dry environment.
PSO	No shock	Protect from shock.
PSA	Do not shake	Do not shake.
UPR	Upright	Keep upright. Do not turn upside down.
MTLF	Metal Free	Container is free of heavy metals including lead.

900

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

This field contains any known or suspected specimen hazards.

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:

905

**HL7 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.

Code	Description	Comment/Usage Note/Definition
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.

- 910 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.

- 915 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 in both transactions [LAB-1], [LAB-2] and [LAB-3].

920 **SPM-19 Specimen Expiration Date/Time (TS)**, optional.

HL7 definition: This field is the date and time the specimen can no longer be used for the purpose implied by the order.

The Technical Framework has not constrained the usage of this field yet.

**SPM-20 Specimen Availability (ID)**, conditional.

- 925 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 messages sent by the Order Filler, within transactions [LAB-1], [LAB-2] and [LAB-3]. The value 'N' indicates either that the laboratory hasn't received the specimen yet, or that it has rejected the received specimen.

930 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).

If SPM-20 = "N" and ORC-5 is empty or valued with "SC" this means that the specimen has not been received yet. In that case SPM-21 is empty.

935 If SPM-20 = "N" and ORC-5 is valued with "CA" this means that the specimen has been rejected by the laboratory and the related Order(s) canceled. SPM-21 must be valued with a reject reason.

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

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

940 Condition predicate: This field shall be populated whenever the laboratory rejects a specimen, in OML messages sent by the Order Filler in transaction [LAB-1], as well as in ORU or OUL messages sent by the Order Filler in transaction [LAB-3].

HL7 Table 0490 lists valid values:

**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	

945 In case a reject reason is not coded, only SPM-21.2 is populated with the reason in a free text format.

**SPM-22 Specimen Quality (CWE), optional.**

HL7 definition: The degree or grade of excellence of the specimen at receipt. The filler populates this attribute.

The Technical Framework has not constrained the usage of this field yet.

950 **SPM-23 Specimen Appropriateness (CWE), optional.**

HL7 Definition: The suitability of the specimen for the particular planned use as determined by the filler.

The Technical Framework has not constrained the usage of this field yet.

**SPM-24 Specimen Condition (CWE), optional, repeatable.**

955 HL7 definition: A mode or state of being that describes the nature of the specimen.

The Technical Framework has not constrained the usage of this field yet.

**SPM-25 Specimen Current Quantity (CQ), optional.**

HL7 definition: This attributes contains the amount of specimen that currently exists or is available for use in further testing.

960 The Technical Framework has not constrained the usage of this field yet.

**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.

965 Example: One 24 Hr urine specimen collected in two bottles.

**SPM-27 Container Type (CWE), conditional.**

The container(s) on or in which a specimen is transported.

Condition predicate:

970 This field shall be populated in ORL messages of transaction [LAB-1], in the context of the use case "Order placed with specimens identified by a third party" defined in volume 1, when the third party is the Order Filler application.

This field shall be populated by the Label Information Provider in RSP messages of transaction [LAB-62] and in OML messages of transaction [LAB-61].

975 The Technical Framework does not further constrain the usage of this field, nor does it provide any preferred vocabulary for it. This can be done in national extensions of this framework.

**SPM-28 Container Condition (CWE), optional.**

HL7 definition: This attributes contains the amount of specimen that currently exists or is available for use in further testing.



980 The Technical Framework does not constrain the usage of this field yet, nor provides any preferred vocabulary for it.

**SPM-29 Specimen Child Role (CWE), optional.**

985 HL7 Definition: For child specimens, this field identifies the relationship between this specimen and the parent specimen. If this field is populated, then SPM-3-Specimen Parent ID must be populated. This field differs from SPM-15-Specimen Role in that this field refers to the role of this specimen relative to a parent role rather than the role of this specimen to the ordered service.

The Technical Framework does not constrain the usage of this field yet.

## C.8 SAC – Container Detail Segment

990 HL7 v2.5: chapter 13

The Technical Framework uses some of the fields of the SAC segment listed below. It allows all other fields to be optionally used, except those superseded by fields of the SPM segment.

**Table C.8-1: SAC Segment**

SEQ	LEN	DT	Usage	Card.	TBL #	ITEM#	Element name
3	80	EI	RE	[0..1]		01331	Container Identifier
4	80	EI	C	[0..1]		01332	Primary (parent) Container Identifier
6	300	SPS	X	[0..0]		00249	Specimen Source
10	80	EI	O	[0..1]		01337	Carrier Identifier
11	80	NA	O	[0..1]		01338	Position in Carrier
13	80	EI	O	[0..1]		01340	Tray Identifier
14	80	NA	O	[0..1]		01341	Position in Tray
15	250	CE	O	[0..*]		01342	Location
26	250	CE	RE	[0..1]		01353	Cap Type

995 **SAC-3 Container Identifier (EI)**, required if available.

SAC-3 field identifies the container. This field is the container's 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.

1000 **SAC-4 Primary (parent) Container Identifier (EI)**, conditional.

Condition predicate: This field is used in transactions [LAB-4] and [LAB-5], [LAB-21], [LAB-22], [LAB-23], [LAB-26], [LAB-61] and [LAB-62] when dealing with an aliquot specimen. It is also used in transactions [LAB-61], [LAB-62] and [LAB-63] in case more than one tube or label for the same specimen has to be printed or confirmed. In all these cases, SAC-3 and SAC-4 are used simultaneously as described below:

1005

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

**SAC-6 Specimen Source (SPS)**, not supported.

1010 This field is superseded by the SPM segment.

**SAC-10 Carrier Identifier (EI)**, optional.

HL7 definition: This field identifies the carrier. It is the ID (e.g., number or bar code) of the carrier where the container (e.g., tube) is located.

The Technical Framework has not constrained the usage of this field yet.

1015 **SAC-11 Position in Carrier (NA)**, optional.

Components: <Value1 (NM)> ^ <Value2 (NM)> ^ <Value3 (NM)> ^ <Value4 (NM)> ^ < ()>

HL7 definition: This field identifies the position of the container in the carrier (e.g., 1...3...). The sub-components allow, if necessary, to transfer multiple axis information, e.g., 2-dimensional carrier (X^Y).

1020 The Technical Framework has not constrained the usage of this field yet.

**SAC-13 Tray Identifier (EI)**, optional.

HL7 definition: This field identifies the tray identifier (e.g., a number of a tray or a bar code on the tray), where the container carrier is located.

The Technical Framework has not constrained the usage of this field yet.

1025 **SAC-14 Position in Tray (NA)**, optional.

Components: <Value1 (NM)> ^ <Value2 (NM)> ^ <Value3 (NM)> ^ <Value4 (NM)> ^ < ()>

HL7 definition: This field identifies the position of the carrier in the tray. The sub-components allow, if necessary, to transfer multiple axis information, e.g., 2-dimensional tray (X^Y).

The Technical Framework has not constrained the usage of this field yet.

1030 **SAC-15 Location (CE)**, optional.

HL7 definition: This field is the physical location that the specimen was at the time that the transaction was initiated. The location description can vary with the LAS. For example, it can be an X, Y, Z coordinate in a storage system; a refrigerator number and drawer number where the container-carrier-tray is located; or it can be the name of the institution and the laboratory which owns the container currently. The repeating of this field allows for hierarchical representation of location (lowest level first), e.g., shelf number, refrigerator storage id, lab name, institution name, etc.

1035

The Technical Framework has not constrained the usage of this field yet.

General rules concerning the communication of specimen id and container id:

1040 In all IHE LAB profiles, when a message references a primary specimen identified and labeled, the identifier (e.g., bar-coded) appearing on the label represents the content of field SPM-2.

1045 In IHE LAB profiles handling workflows between the clinical laboratory and external parties (LTW, LBL, ILW, LPOCT), the specimen identifier is identical to the identifier appearing (e.g., bar coded) on the container that holds this specimen. The proper field to carry this identifier in these profiles is SPM-2 "Specimen identifier".

In IHE LAB profiles handling automated workflows internal to the clinical laboratory (LDA, LAW), the SAC segment is required and carries the “specimen in container” identification.

1050 **SAC-26 Cap Type (CE)**, required if available.

HL7 definition: This field indicates the type of cap that is to be used with this container for decapping, piercing or other mechanisms.

1055 Specific usage in the LBL Profile: This field shall be populated in OML\_O33 and RSP\_K11 messages, sent by the Label Information Provider (LIP) if the SAC segment is present. The presence of the SAC segment means that the LIP has issued the LB to print additional labels for the same specimen, and the SAC-26 field will contain a code identifying the cap type of the tubes where the additional labels will be applied.

## C.9 OBX - Observation/Result Segment

HL7 v2.5.1: chapter 7 (7.4.2)

1060

**Table C.9-1: 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..*]	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	O	[0..*]		01479	Equipment Instance Identifier
19	26	TS	RE	[0..1]		01480	Date/Time of the Analysis
20							Reserved by HL7 for future use
21							Reserved by HL7 for future use
22							Reserved by HL7 for future use

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
23	567	XON	C	[0..1]		02283	Performing Organization Name
24	631	XAD	O	[0..1]		02284	Performing Organization Address
25	3002	XCN	O	[0..1]		02285	Performing Organization Director Name

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

This field contains the sequence number of the OBX.

**OBX-2 Value Type (ID), conditional.**

- 1065 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.
- 1070

**OBX-3 Observation Identifier (CE), required.**

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

- 1075 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.

- 1080 **OBX-4 Observation Sub-ID (ST), conditional.**

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

Condition predicate:

This field is required in two situations:

- 1085
1. In a result message (ORU or OUL) when the OBR segment reports the results of a microbiology culture, then the Observation Sub-ID of each related OBX segment must be populated.
  2. In an order (OML) or result (ORU, OUL) message carrying observations, if under an OBR, there is more than one observation for the same Observation Identifier (OBX-3), then these multiple observations must value OBX-4 so that each OBX
- 1090

segment have a unique combination of OBX-3 (Observation Identifier) and OBX-4 (Observation Sub-ID) values.

In all other situations this field is optional.

1095 Note: For usage of this field in microbiology see Section C.11 “Microbiology Reporting Rules” and the microbiology example in Appendix G.5)

**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 according to the definition made in Chapter 7 of HL7 2.5 version.

1100 **OBX-6 Units (CE), conditional.**

This field should be populated when there is an effective observation value (OBX-5 not empty) and when the type of this observation value is numeric (OBX-2 = "NM" or "SN"). The content of this field shall be taken from the Unified Code for Units of Measure (UCUM).

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

1105 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.**

1110 This field is required when applicable. This field is repeatable in the IHE Laboratory Framework as in the standard. Among the possible values listed for this field in HL7 table 0078, the actors of the Technical Framework should support the following values:

**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.	
MS	Moderately susceptible. Indicates for microbiology susceptibilities only.	
VS	Very susceptible. Indicates for microbiology susceptibilities only.	

1115 The S, R, I, MS and VS 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, I, MS and VS value could be filled in the value field (OBX-5) with a Value Type (OBX-2) set to "ST".

1120 Note: For reporting antimicrobial susceptibilities in microbiology see Section C.11 “Microbiology Reporting Rules” and the microbiology example in Appendix G.5)

**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 Technical Version, the possible values for this field are a subset of this table:

1125

**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 of a results message (analyzer, AM, POCDM, Order Filler...) 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 results messages sent by analyzer, AM, POCDM: result not technically validated. In transaction [LAB-3]: result not clinically validated.
P	Preliminary results	In results message sent by analyzer, AM, POCDM: preliminary result technically validated but can still change In transaction [LAB-3]: preliminary 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 results message sent by analyzer, AM, POCDM, 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 C.10 “Correlations of status between ORC, OBR and OBX”.

**OBX-12 Effective Date of Reference Range (TS), not supported.**

1130 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.

1135 **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.**

1140 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.

1145 In all cases, the observation date-time is the physiologically relevant date-time or the closest approximation to that date-time. For tests performed on specimens, which is the case in the Technical Framework, the relevant date-time is the specimen's collection date-time.

**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.**

1150 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.

1155 **OBX-17 Observation Method (CE), conditional.**

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

1160 **OBX-18 Equipment Instance Identifier (EI), optional.**

HL7 definition: This field identifies the Equipment Instance (e.g., Analyzer, Analyzer module, group of Analyzers,...) responsible for the production of the observation. This is the identifier from an institution's master list of equipment, where the institution is specified by the namespace ID or if it is blank, then by the "Producer's ID" (OBX-15).



- 1165 This repeatable field carries the instrument context of a laboratory result. The repeating of this field allows for the hierarchical representation of the equipment (lowest level first), e.g., module of an instrument, instrument consisting of modules, cluster of multiple instruments, etc.
- OBX-19 Date/Time of the Analysis (TS)**, required if available.
- HL7 definition: This field is used to transfer the time stamp associated with generation of the analytical result by the instrument specified in Equipment Instance Identifier (see above).
- 1170 This field should be valued when the OBX-5 field (Value field) is also valued. It represents the effective date-time the test was performed on the analyzer or on the manual workbench.
- OBX-23 Performing Organization Name (XON)**, conditional.
- This field has been added by release 2.5.1 of HL7. It specifies the laboratory that produced the test result described in this OBX segment. When this field is null, the receiving system assumes that the observations were produced by the sending organization.
- 1175 Condition predicate: This field shall be valued in transaction [LAB-3] when the test result carried by this OBX is produced by an outside laboratory, subcontracting a part of the order. In that case, this field shall be populated with the name of the subcontractor laboratory.
- 1180 **OBX-24 Performing Organization Address (XAD)**, optional.
- This field has been added by release 2.5.1 of HL7. It specifies the address of the laboratory that produced the test result described in this OBX segment.
- This field may be valued in transaction [LAB-3] when the test result carried by this OBX is produced by an outside laboratory, subcontracting a part of the order. If populated the field carries the address of the subcontractor laboratory.
- 1185 The Technical Framework does not constrain the usage further than this. Some national extensions of this Technical Framework (for example the US extension to deal with a CLIA amendment) may enforce this field to be valued whenever OBX-23 is valued.
- OBX-25 Performing Organization Director Name (XCN)**, optional.
- 1190 This field has been added by release 2.5.1 of HL7. It specifies the director of the laboratory that produced the test result described in this OBX segment.
- This field may be valued in transaction [LAB-3] when the test result carried by this OBX is produced by an outside laboratory, subcontracting a part of the order. If populated the field carries the director's name of the subcontractor laboratory.
- 1195 The Technical Framework does not constrain the usage further than this. Some national extensions of this Technical Framework (for example the US extension to deal with a CLIA amendment) may enforce this field to be valued whenever OBX-23 is valued.

## C.10 Correlations of Status between ORC, OBR, OBX

### C.10.1 Semantics of the Main Status Code Associations

1200 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 order.

**Table C.10.1-1: 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
A	C	C	Record coming over is a correction and thus replaces a final result, the corrected results are not yet available or not yet verified, therefore the order is back to a non-completed status.
CA	X	X	(OBX) Results cannot be obtained for this observation. (ORC/OBR) No results available; Order canceled.

1205 Notes:

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.

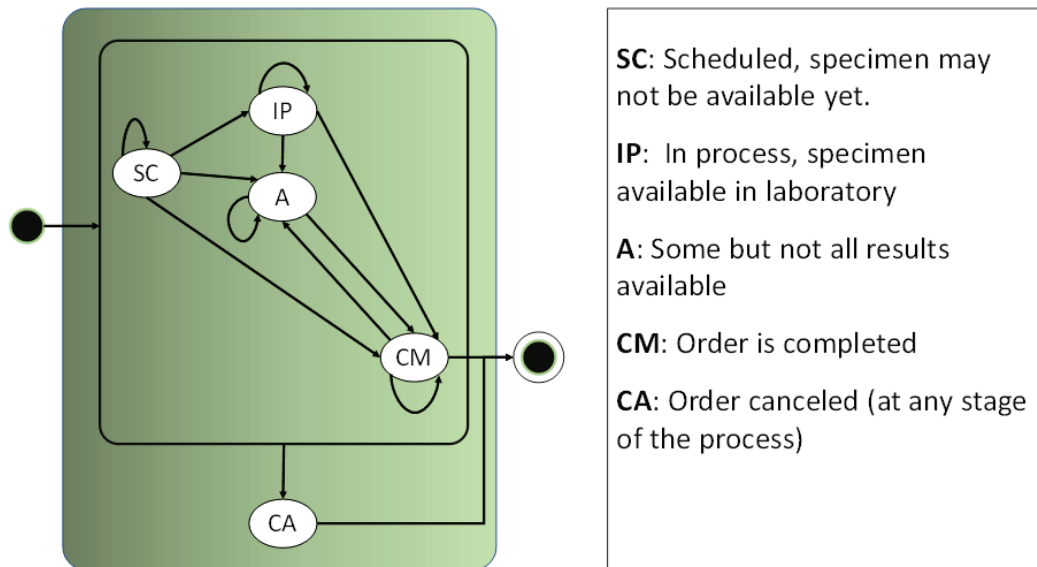
The table shown above contains a description of the semantics of the code values used by these fields. Please note that this table does not identify all possible relationships of the various status fields. The relationship between the various status fields are described below.

1210

## C.10.2 Status Transition Diagrams

### C.10.2.1 ORC-5: Order Status

This field expresses the progress on the order, assessed by the Order Filler. The allowed transitions of this status are specified in the diagram below:



1215

**Figure C.10.2.1-1: The ORC-5 status transition diagram**

The initial value of the filler order status may be SC, IP, A or CM. The process ends when the order is completed (CM) or when it is canceled (CA), which can happen at any stage.

An order completed (CM) has all its final results verified.

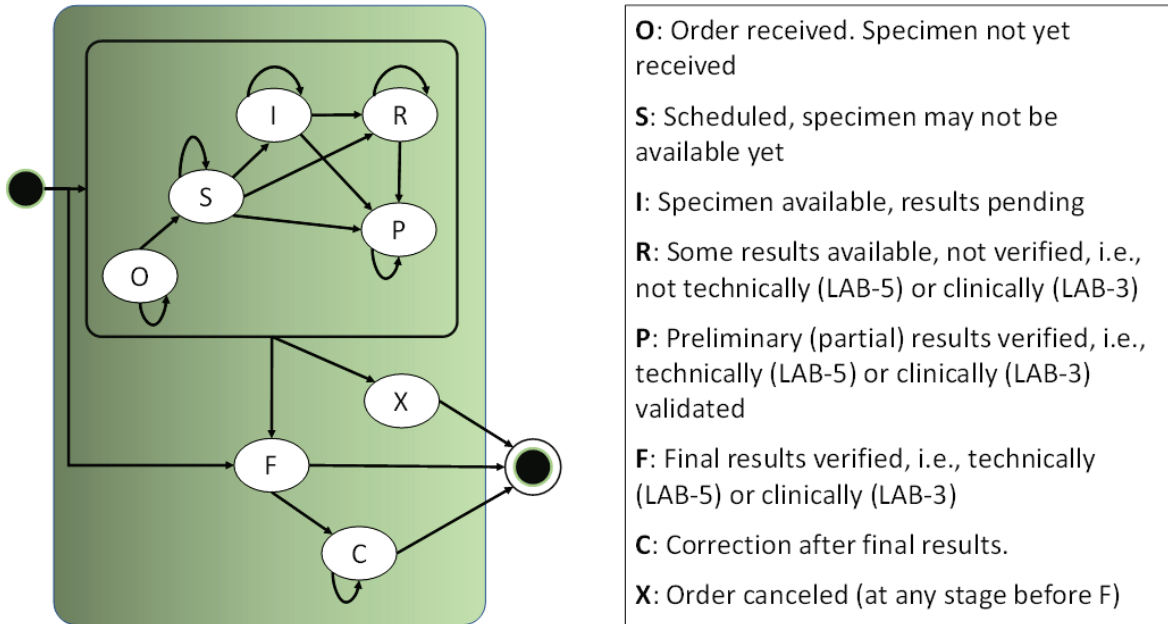
1220 In case the Order Filler corrects a result on an order that was completed, the order status loops on the “CM” value.

In case the Order Filler detects that one of the final results of a completed order needs a correction, and that correction is still pending (a new run of the test being in process), the Order Filler sends a message with the status of the order regressing from CM to A, and the erroneous result being nullified in the corresponding OBX.

1225

### C.10.2.2 OBR-25: Order Result Status

This field expresses the progress on the set of results of the order, produced by the Order Filler. The allowed transitions of this status are specified in the diagram below:

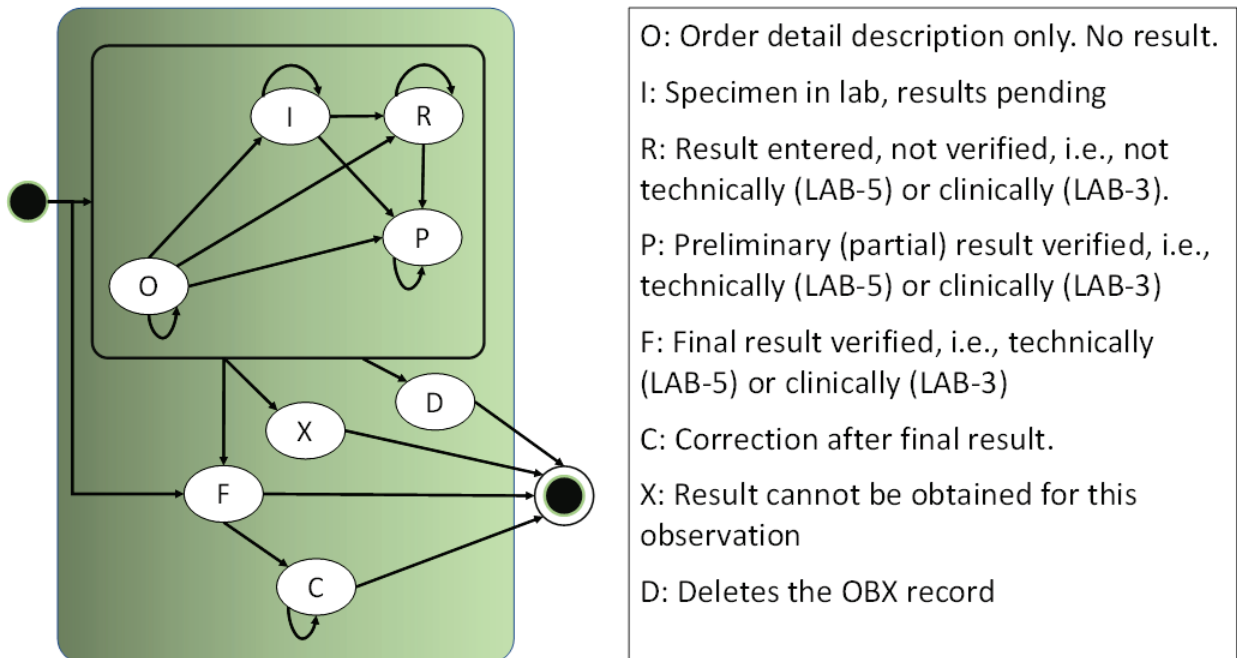


1230

**Figure C.10.2.2-1: The OBR-25 Status Transition Diagram**

**C.10.2.3 OBX-11: Observation Result Status**

This field expresses the result status of an individual observation of the order. The allowed transitions of this status are specified in the diagram below:



1235

**Figure C.10.2.3-1: The OBX-11 Status Transition Diagram**

### C.10.3 Relationship between the 3 Status Fields

1. The *order result status* (OBR-25) can only be ‘F’ (Final) when the *observation result status* (OBX-11) of the observations belonging to this order are valued F, X or D.
- 1240 2. The *filler order status* (ORC-5) can only be ‘CM’ (Complete) when the *order result status* (OBR-25) is valued F (Final) or C (Corrected).
3. When the *order result status* (OBR-25) is valued C (Corrected), it does not necessarily mean that the results are complete and final. The *filler order status* (ORC-5) is valued CM if that is the case. Otherwise ORC-5 is valued A.

### C.11 Microbiology Reporting Rules

1245 This section explains how messages carrying microbiology results shall be structured in transactions [LAB-3], [LAB-5] and [LAB-23] of this Technical Framework.

Complete examples of microbiology result messages, compliant with these requirements are shown in Section 4.5 of Volume 2a.

1250 The requirements expressed in this section are aligned with Appendix A of the “*INTEROPERABLE LABORATORY RESULT REPORTING TO EHR (US REALM) RELEASE 1*” Implementation Guide and with Appendix A of the “*V 2.5.1 Implementation Guide: Orders & Observations; Ambulatory Care Lab Result (ELINCS), Release 1*”. Both implementation guides have been published by HL7 ([www.hl7.org](http://www.hl7.org)). These requirements on messages carrying microbiology results apply to the following exchanges:

- 1255 1. from analyzer to LAS (transaction [LAB-23])
2. from LAS to LIS (transaction [LAB-5])
3. from LIS to CIS/EMR in intra-hospital workflow (transaction [LAB-3])

#### C.11.1 Principle

1260 The effective reporting of culture results and antimicrobial sensitivities requires that data across different OBR segments and OBX segments be appropriately associated (for example, to associate the correct antimicrobial sensitivity with the correct cultured organism when multiple organisms have grown). HL7 v2.5.1 provides specific mechanisms to represent such associations, which must be used when reporting culture and sensitivity results.

#### C.11.2 Culture Results

1265 Culture results typically report the identity of cultured organisms and (sometimes) quantify the degree to which such organisms appear in the cultured specimen. Such results shall be reported as described below.

### C.11.2.1 Definition

1270 A “culture” is any microbiological test in which infectious organisms are identified and characterized by allowing the organisms present in a specimen to reproduce in predetermined media in laboratory. The cultured organisms may be bacteria, viruses, or parasites. The results of any such test must be reported according to the specification below.

### C.11.2.2 OBX-3 Observation Identifier

1275 For OBX segments in which a cultured organism is identified, an appropriate LOINC® code must be used, i.e., a code with the LOINC® component value of “MICROORGANISM IDENTIFIED”. There are approximately 175 such LOINC® codes in version 2.15 of the LOINC® terminology, varying with respect to the method of culture and the specimen type.

The above example shows two organisms identified, reported with the LOINC® code 11475-1 in OBX-3.

1280 For OBX segments in which the colony count of a cultured organism is reported, an appropriate LOINC® code must be used, i.e., a code with the component value of “COLONY COUNT”. There are approximately 10 such LOINC® codes in version 2.15 of the LOINC® terminology.

The above example shows two colonies counted, reported with the LOINC® code 564-5 in OBX-3.

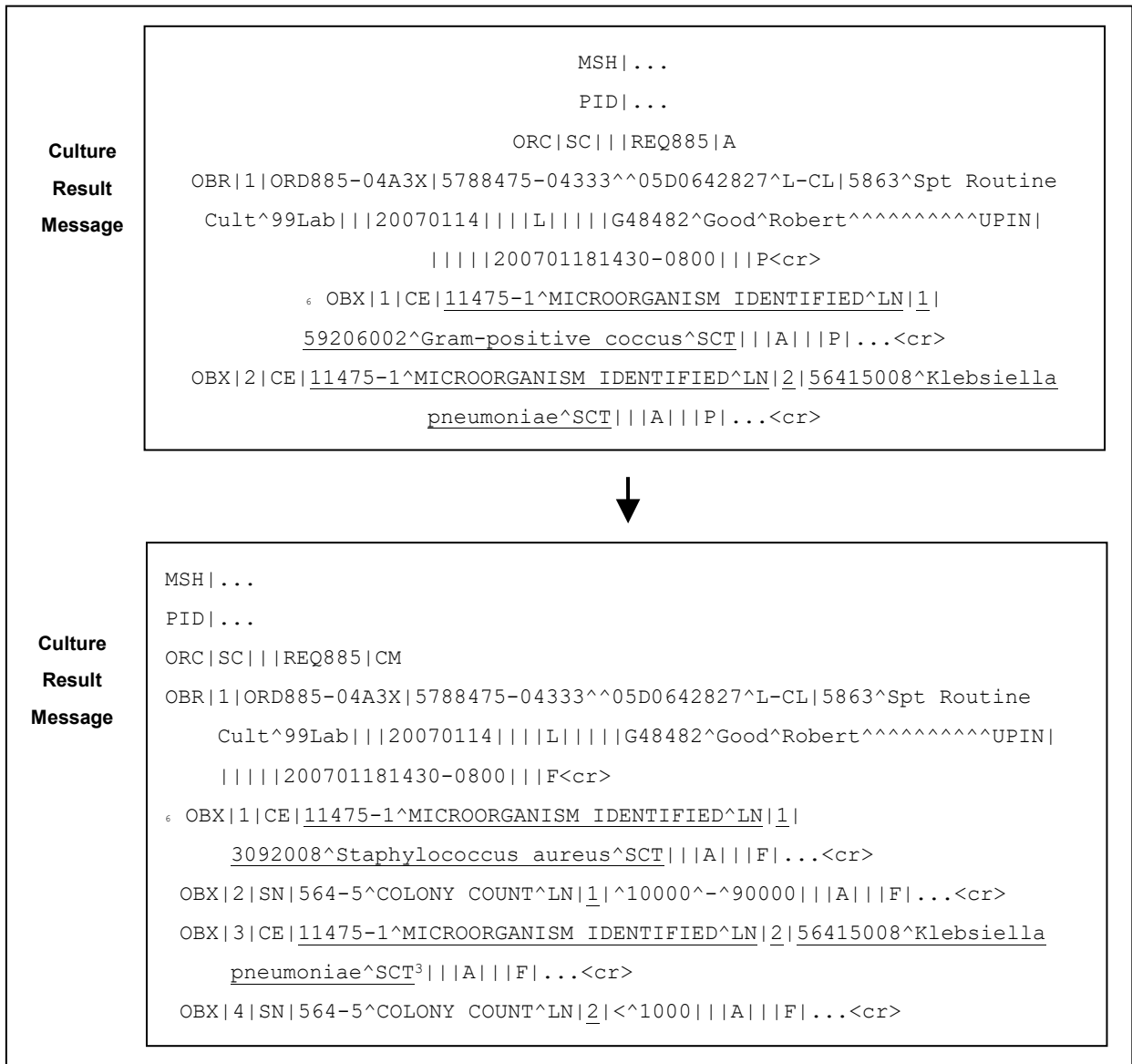
### 1285 C.11.2.3 OBX-4 Observation Sub-ID

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

1295 Note 1: Even if only one OBX segment appears for each identified organism, the Observation Sub-ID field must be populated in these OBX segments, because the value of the Observation Sub-ID field is used to reference the appropriate OBX segment in subsequent reporting of antimicrobial sensitivities. Even in the case that only a single OBX segment is used to report a culture result, the Observation Sub-ID field must be populated, for the same reason. For example, if only one organism had been identified in the example above and no colony counts had been reported, the Observation Sub-ID field would still need to contain the value “1”.

1300 Note 2: Within any OBR segment, the OBX segments must be sequenced such that they are grouped by their Observation Sub-ID values. For example, in the culture result shown above, the OBX segments with the Observation Sub-ID value “1” all appear before the OBX segments with the Observation Sub-ID value “2”.

1305 Note 3: When the results of a specific culture are sent more than once (for example, as a preliminary result and later as a final result), the combination of OBX-3 (Observation Identifier) and OBX-4 (Observation Sub-ID) values for the identified organisms must be the same in each result message that is sent. This consistency allows the receiving system to correctly update the identified organisms as they are revised by the sending system. The example below shows the preliminary and the (subsequently sent) final values of a sputum culture, with the OBX-3 (Observation Identifier) and OBX-4 (Observation Sub-ID) values maintained correctly.



1310

**Figure C.11.2.3-1: Example of Successive Culture Results Messages**

### C.11.2.4 OBX-5 Observation Value

1315

The value of each organism identified by a culture must be represented by a coded entity (CE data type). Use of a standard coding system, such as SNOMED CT®, will enable important reporting and decision-support capabilities for infectious diseases. When SNOMED codes are used, the SNOMED CT® concept ID should appear in the first component of OBX-5 and the coding system designator “SCT” should appear in the third component. The second component should be populated with an accurate text description of the organism identified, typically the preferred display term as assigned by the SNOMED CT® terminology. Regardless of the coding

1320 system used, the first three components of OBX-5 must be populated with the code, text description, and coding-system designator, respectively.

Note 1: Use of the SNOMED CT® terminology is most useful for encoding the Observation Value in the OBX that identifies an organism (e.g., the first and third OBX segments in the sample message above). The Observation Value for colony counts or other observations related to the culture may be represented in any reasonable way chosen by the laboratory.

### **C.11.3 Antimicrobial Sensitivities Results**

1325 Antimicrobial sensitivity (or susceptibility) results report the sensitivity of cultured microorganisms to specific antibiotics, a standard part of medical microbiology and critical to the treatment of infectious diseases. The reporting of such tests in a uniformly structured and coded manner allows EHR systems to assist in the selection or assessment of antibiotic therapies, thereby promoting effective care and patient safety.

1330 Such tests shall be reported as described in this section.

#### **C.11.3.1 Definition**

1335 An antimicrobial sensitivity test is any test that assesses the susceptibility of a microorganism previously identified via culture to one or more specific antibiotic medications. The results of such a test may indicate, for example, that the microorganism is “susceptible,” “moderately susceptible,” or “resistant” to a specific antibiotic.

#### **C.11.3.2 An Example**

The following example shows the final results of a sputum culture that identified *Staphylococcus aureus* and Beta hemolytic *Streptococcus A*, and the results of subsequent sensitivity testing on these organisms with respect to the antimicrobials Ampicillin and Amoxicillin/Clavulanate.

1340 Note that the sensitivity tests were performed as “reflex tests,” i.e., they were initiated by the laboratory in response to the positive culture results.

This example is a message ORU^R01 of transaction [LAB-3], assuming that transaction [LAB-2] has been used in the meantime to obtain a Placer Order Number for the sensitivity test orders.



MSH|...  
 PID|...

**Culture  
 Results  
 with two  
 isolates  
 identified**

```

ORC|SC|||REQ885|CM
OBR|1|ORD885-04A3X1|5788475-04333^^05D0642827^L-CL2|5863^Spt Routine
  Cult^99Lab|||20070114|||L|||
  G48482^Good^Robert^^^^^^^UPIN|||200701181430-0800|||F<cr>
OBX|1|CE|11475-1^MICROORGANISM IDENTIFIED^LN|1|
  3092008^Staphylococcus aureus^SCT|||A|||F|...<cr>
OBX|2|SN|564-5^COLONY COUNT^LN|1|^10000^-^90000|||A|||F|...<cr>
OBX|3|CE|11475-1^MICROORGANISM IDENTIFIED^LN|2|
  412643004^Beta hemolytic Streptococcus A^SCT|||A|||F|...<cr>
OBX|4|SN|564-5^COLONY COUNT^LN|2|<^1000|||A|||F|...<cr>
  
```

**Sensitivity  
 Result on  
 isolate 1  
 (reflex  
 test)**

```

ORC|SC|||REQ885|CM
OBR|2|ORD885-04A4Y1|5788475-04334^^05D0642827^L-CL2|6402^Bacterial Susc
  Panel Islt^99Lab|||20070114|||G|||
  G48482^Good^Robert^^^^^^^UPIN|||200701181430-0800|||F|
  11475-1^MICROORGANISM IDENTIFIED&LN^1^
  Staphylococcus aureus3||
  ORD885-04A3X^5788475-04333&&05D0642827&L-CL4<cr>
OBX|1|NM|28-1^Ampicillin^LN6|1|32|ug/mL||R7|||F|...<cr>
OBX|2|NM|20-8^Amoxicillin+Clavulanate^LN5|1|2|ug/mL||S6|||F|...<cr>
  
```

**Sensitivity  
 Result on  
 isolate 2  
 (reflex  
 test)**

```

ORC|SC|||REQ885|CM
OBR|3|ORD885-04A5Z1|5788475-04335^^05D0642827^L-CL2|6402^Bacterial Susc
  Panel Islt^99Lab|||20070114|||G|||
  G48482^Good^Robert^^^^^^^UPIN|||200701181430-0800|||F|
  11475-1^MICROORGANISM IDENTIFIED&LN&783&CultOrg&99Lab^2^
  Beta hemolytic Streptococcus A3||
  ORD885-04A3X^5788475-04333&&05D0642827&L-CL4<cr>
OBX|1|NM|28-1^Ampicillin^LN6|2|2|ug/mL||S7|||F|...<cr>
OBX|2|NM|20-8^Amoxicillin+Clavulanate^LN5|2|2|ug/mL||S6|||F|...<cr>
  
```

1345

- Superscript 1: OBR-2 Placer Order Number
- Superscript 2: OBR-3 Filler Order Number
- Superscript 3: OBR-26 Parent Result
- Superscript 4: OBR-29 Parent
- Superscript 5: OBR-50 Parent Universal Service Identifier
- Superscript 6: OBX-4 Observation ID
- Superscript 7: OBX-8 Abnormal Flags

**Figure C.11.3.2-1: Example of complete microbiology reporting, with sensitivity**

1350 Note 1: Each Placer Order Number (OBR-2) and each Filler Order Number (OBR-3) in this message is unique, in conformance with this Technical Framework. In particular, the order numbers in the sensitivity tests differ from the order numbers of the culture. The laboratory requisition all these orders belong to, is identified by its Placer Group Number REQ885 in ORC-4.

**C.11.3.3 OBR-26 Parent Result**

1355 In the OBR segment of a sensitivity result, the value of the Parent Result field references the OBX segment for the identified organism that prompted the sensitivity testing. For example, the value in the Parent Result field of the first sensitivity result above is:

11475-1&MICROORGANISM IDENTIFIED&LN&783&CultOrg&99Lab^1^Staphylococcus aureus

1360 which references the Observation ID (OBX-3), Observation Sub-ID (OBX-4), and the text component of the Observation Value (OBX-5.2) of the first OBX segment in the culture result.

The table below shows the correspondence between the components and sub-components of OBR-26 Parent Result field in the sensitivity result and the fields and components of the corresponding OBX segment in the culture result:

1365 **Table C.11.3.3-1: Field OBR-26 - Parent Result (Sensitivity Result)**

Component/Sub-Component in OBR-26	Usage	Referenced Field/Component in Parent OBX Segment
OBR-26.1 (1 <sup>st</sup> component)	R	
OBR-26.1.1 ( 1 <sup>st</sup> sub-component)	R	OBX-3.1 Observation Identifier.Identifier
OBR-26.1.2 (2 <sup>nd</sup> sub-component)	RE	OBX-3.2 Observation Identifier.Text
OBR-26.1.3 (3 <sup>rd</sup> sub-component)	RE	OBX-3.3 Observation Identifier.Name of Coding System
OBR-26.1.4 ( 4 <sup>th</sup> sub-component)	RE	OBX-3.1 Observation Identifier.Alt Identifier
OBR-26.1.5 (5 <sup>th</sup> sub-component)	RE	OBX-3.2 Observation Identifier.Alt Text
OBR-26.1.6 (6 <sup>th</sup> sub-component)	RE	OBX-3.3 Observation Identifier.Name of Alt Coding System
OBR-26.2 (2 <sup>nd</sup> component)	R	OBX-4 Observation Sub-ID
OBR-26.3 (3 <sup>rd</sup> component)	R	OBX-5.2 Observation Value.Text

Note 1: Because organisms identified in culture results must be reported as coded entities, one can safely assume that OBX-5.2 of the parent result will be the text representation of a coded entity.

**C.11.3.4 OBR-29 Parent**

1370 OBR-29 references the values of the Placer Order Number (OBR-2) and the Filler Order Number (OBR-3) in the OBR segment of the culture result that spawned the sensitivity testing. OBR-29 must be populated when reporting the result of any reflex test, including an antimicrobial susceptibility.

In the example above, the value of OBR-29 for both sensitivity results is:

ORD885-04A3X^5788475-04333&&05D0642827&L-CL

1375 which reflects the values of OBR-2 and OBR-3 in the preceding culture result:

OBR-2: ORD885-04A3X                      OBR-3: 5788475-04333^^05D0642827^L-CL

Referencing the OBR-2 and OBR-3 values of the “parent” culture allows a receiving system to uniquely associate sensitivity results with the culture results that generated them.

1380 The table below shows the usage and semantic of the components of OBR-29 Parent field in the sensitivity result:

**Table C.11.3.4-1: Field OBR-29 - Parent (EIP)**

Component/Sub-Component	Usage
OBR-29.1 Placer assigned identifier (EI) → OBR-2 of culture OBR	R
OBR-29.2 Filler assigned identifier (EI) → OBR-3 of culture OBR	R

**C.11.3.5 OBX-3 Observation Identifier**

1385 For sensitivity results, the Observation Identifier must be encoded using the LOINC® terminology. Specifically, the value of the observation identifier must be one of the LOINC® codes designated to identify antimicrobials tested within susceptibility panels, i.e., codes with a PROPERTY attribute of “SUSC”. The LOINC® coding system includes approximately 1100 such codes, which cover all antimicrobials that are typically assessed in microbiology sensitivity testing.

Sample Values:

- 1390 1-8^ ACYCLOVIR^LN  
 12-5^ AMIKACIN:MIC^LN  
 193-3^ CLINAMYCIN:MIC^LN  
 395-4^ PENICILLIN V:MLC^LN

**C.11.3.6 OBX-5 Observation Value**

1395 For sensitivity results, the Observation Value field may be represented in whatever manner suits the laboratory and is consistent with conventional practice (in particular the MIC value). The uniform coding of the Abnormal Flags field (see below) is more important for the automated processing of sensitivity results.

**C.11.3.7 OBX-8 Abnormal Flags**

1400 For sensitivity results, the value of the Abnormal Flags field must be one of the following values from Table 0078:

**Table C.11.3.7-1: Subset of HL7 Table 0078 for Antimicrobial Sensitivity**

Value	Description
S	Susceptible. Indicates for microbiology susceptibilities only.
R	Resistant. Indicates for microbiology susceptibilities only.
I	Intermediate. Indicates for microbiology susceptibilities only.
SDD	Susceptible Dose Dependent

1405 **C.12 QAK – Query Acknowledgment Segment**

This segment is used in the response to query messages of these transactions:

- Query for Label Delivery Instruction [LAB-62]
- Query for Work Order Step [LAB-22]

**Table C.12-1: QAK Segment**

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM #	Element name
1	32	ST	C	[0..1]		00696	Query Tag
2	2	ID	R	[1..1]	0208	00208	Query Response Status
3	250	CE	O	[0..1]	0471	01375	Message Query Name
4	10	NM	O	[0..1]		01434	Hit Count
5	10	NM	O	[0..1]		01622	This payload
6	10	NM	O	[0..1]		01623	Hits remaining

1410

**QAK-1 Query Tag (ST)**, conditional.

This field in the response message is echoing QPD-2 in the query message.

Condition predicate: QAK-1 shall be valued with the content of QPD-2 received in the query message.

1415 **QAK-2 Query Response Status (ID)**, required.

This mandatory field carries one of these values:

**HL7 Table 0208 - Query Response Status**

Value	Description	Comment
OK	Data found, no errors (this is the default)	
NF	No data found, no errors	
AE	Application error	
AR	Application reject	

### C.13 MFI – Master File Identification Segment

This segment is used by transaction [LAB-51].

1420

**Table C.13-1: MFI – Master File Identification**

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	250	CE	R	[1..1]	0175	00658	Master File Identifier
2	180	HD	R	[1..1]		00659	Master File Application Identifier
3	3	ID	R	[1..1]	0178	00660	File-Level Event Code
4	26	TS	O	[0..1]		00661	Entered Date/Time
5	26	TS	R	[1..1]		00662	Effective Date/Time
6	2	ID	R	[1..1]	0179	00663	Response Level Code

#### **MFI-1 Master File Identifier (CE), required.**

It shall contain one of the values:

- OMA (Numerical Observation Master File)
- OMB (Categorical Observation Master File)
- OMC (Observation batteries master file)
- OMD (Calculated Observations Master File)

1425

#### **MFI-2 Master File Application Identifier (HD), required.**

Contains a code of up to 180 characters which uniquely identifies the application responsible for maintaining this file at a particular site.

1430

The value of this field shall be formatted by concatenating the values below using the “\_” (underscore) character as a separator:

- the name of the application that owns the code set. This shall be equal to the value of the field MSH-3 Sending Application.
- the type of master file. This shall be equal to the value of the field MFI-1 Master File Identifier.
- the language of the (textual descriptions of the) code set. This shall be equal to the value contained in the field MSH-19 Principal Language of the Message.
- (optional, if applicable) the version/revision of the code set. The character string used to identify a new version or revision should sort to be alphabetically “later” when compared to any previous versions or revisions.

1435

1440

1445 The resulting identifier will have the form “SENDINGAPP\_MFTYPE\_LANGUAGE” or “SENDINGAPP\_MFTYPE\_LANGUAGE\_VERSION”. The receiver should not attempt to deconstruct this string into its constituent elements; it should use the identifying string in its entirety. With the exception of version/revision all elements are available elsewhere in the message.

Examples include “Lab1\_OMA\_EN\_1.2” or “X-PAS\_OMB\_FR”.

**MFI-3 File-Level Event Code (ID), required.**

1450 It shall contain the value REP (replace current version of this master file with the version contained in this message).

**MFI-5 Effective Date/Time (TS), required.**

1455 Contains the date/time the Code Set Master expects that the event is to have been completed on the receiving system. The sending system should use the current date/time as a default. The Code Set Consumer shall process the event as soon as possible if the value of this field is in the past. If the value of this field is at some point in the future, then the Code Set Consumer shall process the event *before* that time.

**MFI-6 Response Level Code (ID), required.**

1460 It shall contain the value ER. The acceptance status of the individual master file entries is only to be reported in case of an error. Since the Technical Framework uses the HL7 original acknowledgment mode, all MFA segments must be returned via the application-level acknowledgment message.

## C.14 MFE – Master File Entry Segment

**Table C.14-1: MFE – Master File Entry Segment**

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM#	Element name
1	3	ID	R	[1..1]	0180	00664	Record-Level Event Code
2	20	ST	R	[1..1]		00665	MFN Control ID
3	26	TS	O	[0..1]		00662	Effective Date/Time
4	200	Varies	R	[1..1]		00667	Primary Key Value – MFE
5	3	ID	R	[1..1]	0355	01319	Primary Key Value Type

1465 **MFE-1 Record-Level Event Code (ID), required.**

It shall contain the value MAD (add record to master file). Given that the file-level event code is REP, each MFE segment must have a record-level event code of MAD.

**MFE-2 MFN Control ID (ST)**, required.

1470 The response level code is ER. It contains an identifier that uniquely identifies the change to the record.

**MFE-4 Primary Key Value – MFE**, required.

Uniquely identifies a record of the code set. The data type of this field is CE (coded element). One unique identifier shall be provided; the last 3 components of the CE data type shall not be valued.

1475 **MFE-5 Primary Key Value Type (ID)**, required.

Contains the value CE (coded element).

## **Appendix D – <Place Holder>**

Left blank intentionally.



## Appendix E – Implementation Notes for POCT1-A DML

1480 The transactions [LAB-30] and [LAB-31] between the actors POCRG and POCDM rely on  
*Device Messaging Level* interface defined in Appendix B of the standard POCT1-A.. In this  
*DML* interface the POCRG is called the “*Device*” and the POCDM is called “*Observation  
Reviewer*”.

1485 All messages of DML are encoded in XML (eXtended Markup Language). The syntax of each of  
these messages is defined by a DTD (Document Type Definition).

The *Device* communicates with the *Observation Reviewer* through an *Access Point*, which can  
be part of a *Device* persistently connected to the network, or be a subsystem that consolidates  
data from one or more *Devices* onto an established communication link with the *Observation  
Reviewer* (POCDM).

1490

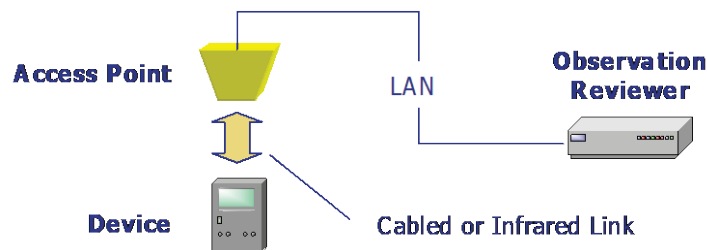


Figure E-1: Excerpt from POCT1-A

1495 The IHE LPOCT Profile does not describe the protocol between the *Device* and the *Access  
Point*, and recommends that manufacturers refer to and adopt the standard POCT1-A  
specification for this layer.

1500 The IHE LPOCT Profile describes the use of the DML, which is the top layer of the interface  
between the *Device* (POCRG) and the *Observation Reviewer* (POCDM). The lower layer  
protocols are not described in this IHE profile. IHE recommends the use of the MLLP transport  
protocol between the Device Access Point and the POCDM, as this protocol is used by all  
profiles of the Technical Framework.

### E.1 IHE usages for DML

The conventions of usage in the DML interface from POCT1-A are the same as those defined for  
HL7 messages in Section 2.2.1 of this volume (R, RE, O, C, X).

### E.2 Conversations and Topics

1505 Appendix B of POCT1-A defines two terms:

**Conversation:** A prescribed flow of messages between the Device and Observation Reviewer,  
having both an initialization and a termination phase. A Conversation is made up  
of a series of ‘Topics.’

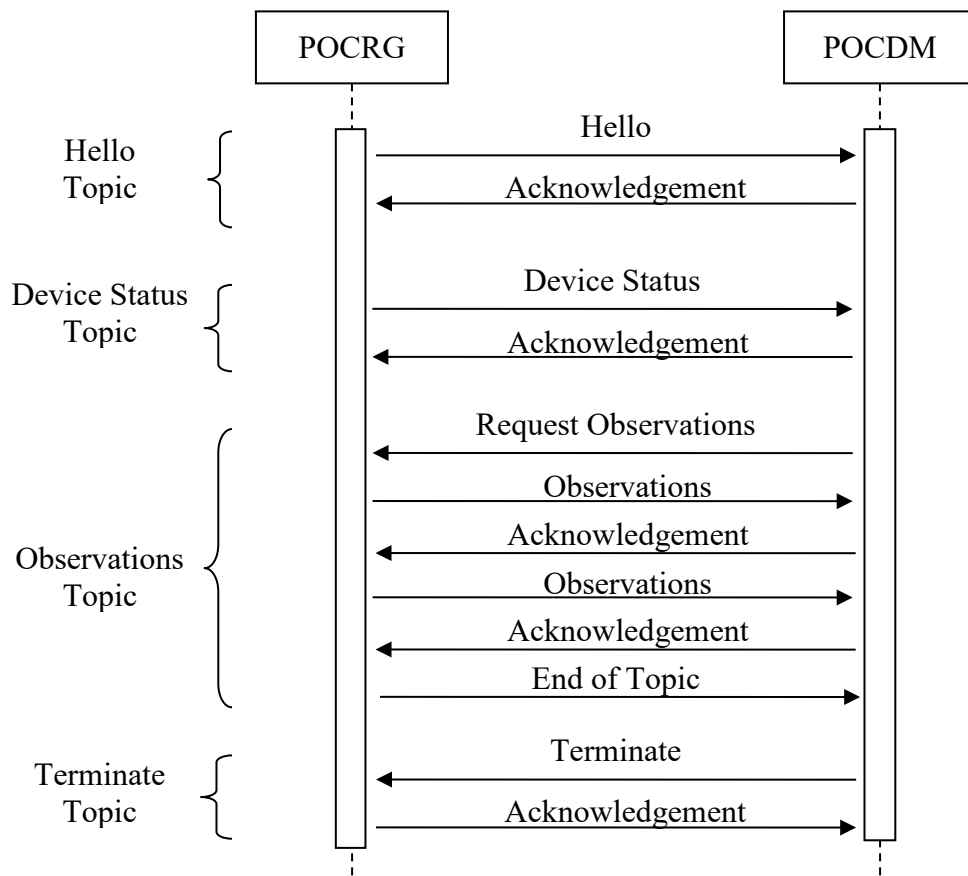
1510 **Topic:** The flow of messages to exchange a complete set of data within a Conversation (e.g., Observations, Device Events). A Topic is composed of a series of ‘Messages.’

The IHE LPOCT Profile describes only the Topic **Observations** which is used by transactions [LAB-30] and [LAB-31]. It is assumed that the systems implementing a POCRG or a POCDM support the other Topics listed below, according to the standard POCT1-A.

1515 **POCT1-A “basic profile” for transaction [LAB-31]**

To support transaction [LAB-31] of LPOCT Integration Profile, a **Device** (POCRG) and an **Observation Reviewer** (POCDM) must support at least the “**Basic Profile**”, as defined in Appendix B Section 4.1 of POCT1-A.. This “**Basic Profile**” specifies a minimum set of “**Topics**” that Devices and Observation Reviewers must support. These topics are:

- 1520
- Hello
  - Device Status
  - Observations
  - Terminate



1525

**Figure E.2-1: Error-Free Basic Profile Flow, POCT1-A – Appendix B**

The “Terminate” topic can also be performed in reverse, with the POCRG sending a Terminate message and the POCDM acknowledging it. This termination can occur at any time.

**Continuous Mode to support Transactions [LAB-30] and [LAB-31]**

1530

To support the “Patient Identity Checking” Option of this Profile (i.e., the transaction [LAB-30] between POCRG and POCDM) the *Device* (POCRG) and the *Observation Reviewer* (POCDM) must support the “*Continuous Mode*”, as defined in Appendix B of POCT1-A.. This *Continuous Mode* requires that Devices and Observation Reviewers support a more complete set of *Topics*:

1535

- Hello
- Device Status
- Directives (with at least START\_CONTINUOUS Directive)
- Observations
- Keep Alive

1540

- Termination

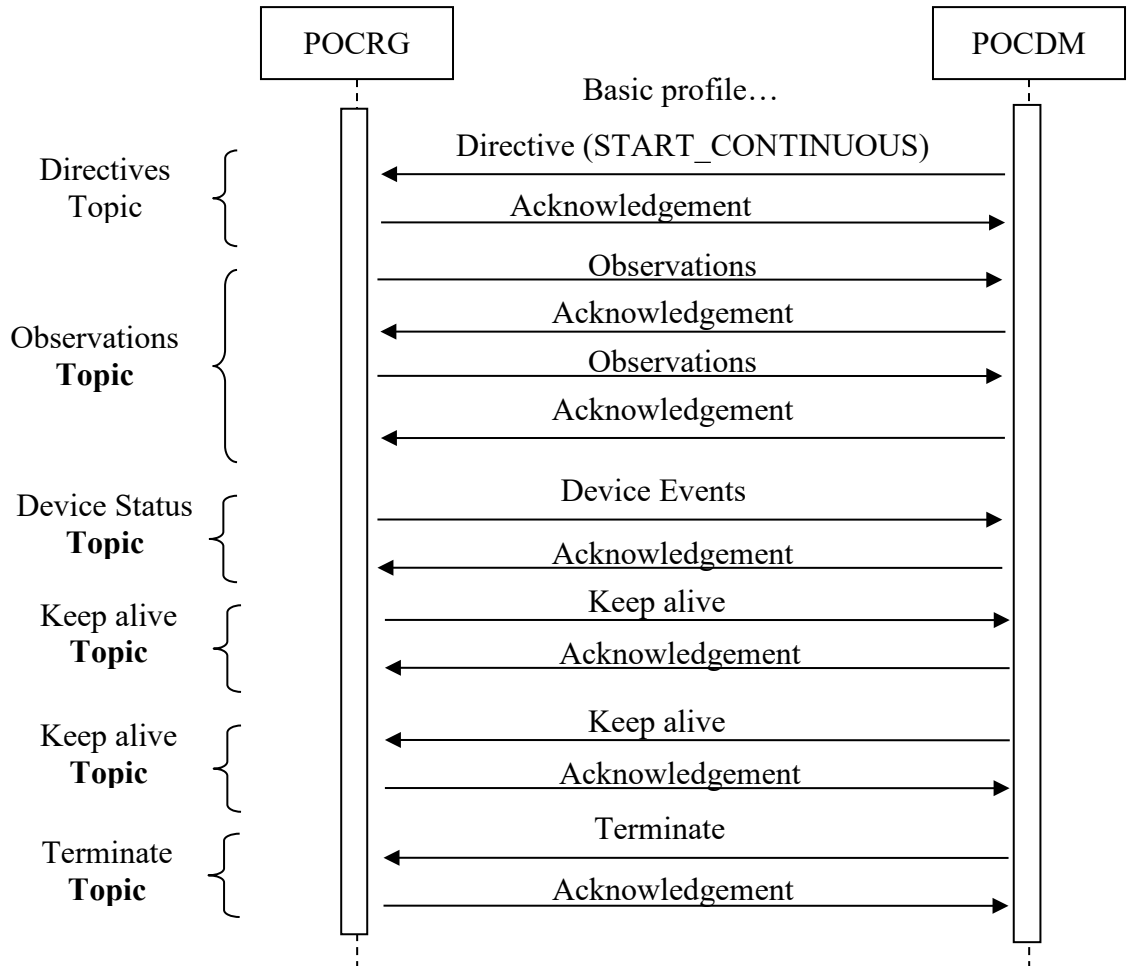
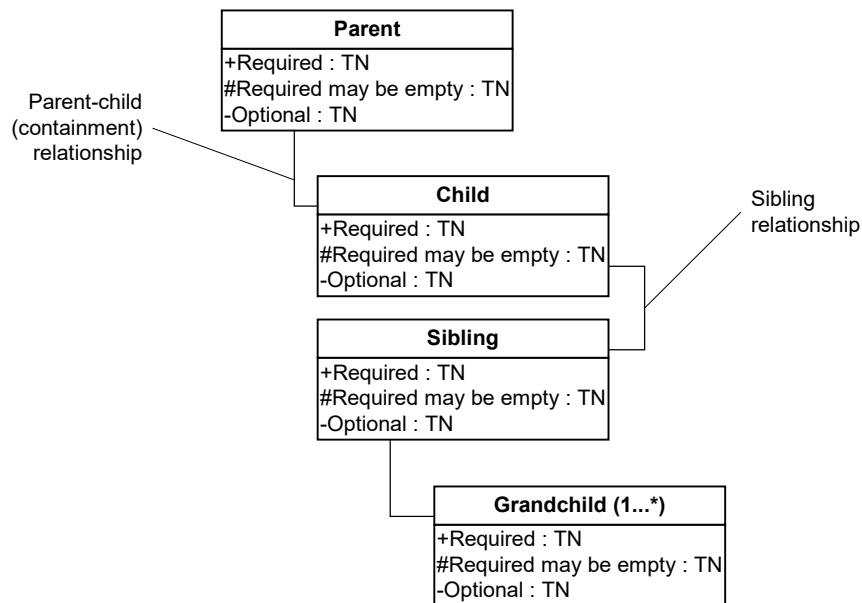


Figure E.2-2: Continuous Mode

## 1545 E.3 Characteristics of DML Messages

### Notation

DML messages are encoded in XML. As any XML document, a DML message is a hierarchic tree. The POCT1-A standard uses the following representation for this hierarchic structure:



1550 **Figure E.3-1: Message Model Example, excerpt from POCT1-A – Appendix B**

Each element is represented as an object. Object cardinality is noted as part of the object name:

- (0...1) – zero or one instance
- (0...\*) – zero or more instances
- (1...\*) – one or more instances
- The absence of a cardinality notation indicates one, and only one, instance

1555

The components of the object are sub-elements of the XML element.

- sub-elements preceded by '+' are Required
- sub-elements preceded by a '-' are Optional
- sub-elements preceded by '#' are Required if available (may be empty if there is no relevant data (which corresponds to the "RE" usage code))

1560

## Use of the Header Object in DML Messages

Every message of the DML starts with a mandatory Header object encoded with the XML **<HDR>** element. This IHE profile defines the following usage for this object:

Attribute	Data Type	IHE Usage	IHE Cardinalities	Description
message_type	CV	X	[0..0]	A code made up of the message name and trigger value. Examples: “OBS.R01”, “ACK.R01”. This field is redundant with the root element of the message. It is not supported by IHE.
control_id	ST	R	[1..1]	A string guaranteed to uniquely identify this message instance throughout the conversation
version_id	ST	R	[1..1]	Set to “POCT1” for all messages that adhere to this standard
creation_dttm	TS	R	[1..1]	The sender’s time when the message was sent.
encoding_chars	ST	X	[0..0]	Not used by IHE

1565 Example of the beginning of a message of the Hello Topic:

```

1570 <HEL.R01>
      <HDR>
        <HDR.control_id V="10001"/>
        <HDR.version_id V="POCT1"/>
        <HDR.creation_dttm V="2001-11-01T16:30:00-08:00"/>
      </HDR>
      ...
  
```

## Hello Topic in DML

1575 The Hello Topic contains two messages: The Hello message sent by the *Device* (POCRG) and the acknowledgement message sent by the *Observation Reviewer* (POCDM).

A Device sends the Hello message only once as the first message in a Conversation. This message identifies the *Device*, its capabilities, its status, and the *Access Point* with its unique network address and port number.

- 1580 • The root element of this message is <HEL.R01>
- The header element of this message, is miked in any message <HDR>
- The element representing the Device (POCRG) is <DEV>
- The element representing the Device capabilities is <DCP>
- The element representing the Device static capabilities is <DSP>
- 1585 • The element representing the Access Point is <AP>

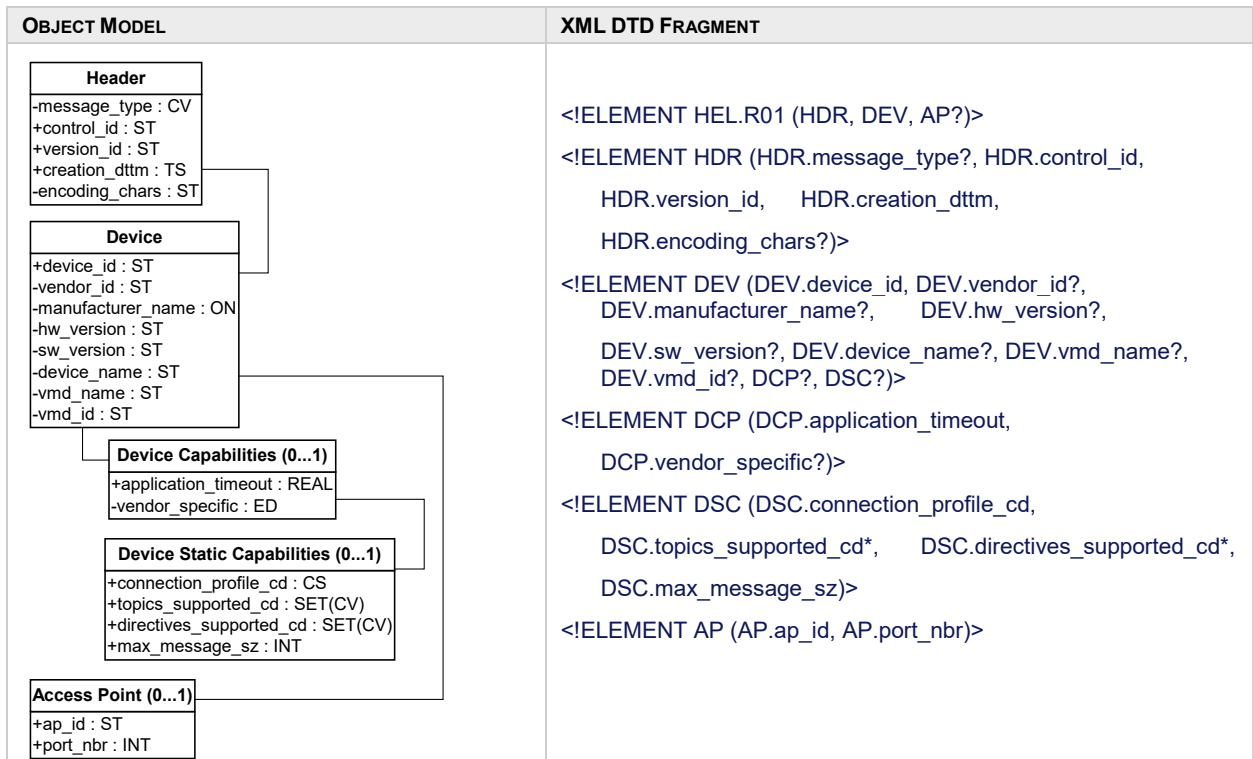


Figure E.3-2: Hello Message Model, excerpt from POCT1-A – Appendix B

Example of Hello message taken from POCT1-A – appendix B:

```

1590 <HEL.R01>
      <HDR>
        <HDR.control_id V="10001"/>
        <HDR.version_id V="POCT1"/>
        <HDR.creation_dttm V="2001-11-01T16:30:00-08:00"/>
      </HDR>
1595 <DEV>
        <DEV.device_id V="0A-00-19-00-00-00-23-84"/>
        <DEV.vendor_id V="BCHMX"/>
        <DEV.model_id V="8000A"/>
        <DEV.serial_id V="42367C"/>
        <DEV.manufacturer_name V="Biochemtronix"/>
        <DEV.hw_version V="8000A-C"/>
        <DEV.sw_version V="2001-10-04"/>
        <DEV.device_name V="ICU-4 Glucose"/>
        <DCP>
          <DCP.application_timeout V="60"/>
        </DCP>
        <DSC>
          <DSC.connection_profile_cd V="SA"/>
          <DSC.topics_supported_cd V="DTV"/>
          <DSC.topics_supported_cd V="OP_LST"/>
          <DSC.directives_supported_cd V="SET_TIME"/>
          <DSC.directives_supported_cd V="LOCK"/>
          <DSC.directives_supported_cd V="UNLOCK"/>
          <DSC.max_message_sz V="800"/>
1610
    
```

1615     </DSC>  
 </DEV>  
 <AP>  
     <AP.ap\_id V="00-10-9D-FF-FF-23-45-67"/>  
     <AP.port\_nbr V="0"/>  
 </AP>  
 1620 </HEL.R01>

## E.4 Main Data Types in DML for Transactions [LAB-30] and [LAB-31]

### PN – Person name

1625 The PN data type is used to communicate the elements of a person’s name. This data type may carry:

- One single attribute “V” that contains a formatted for display version of the name.
- Any of the child elements described below:

Element	Use
GIV	The given name component
MID	The middle name component
FAM	The family name component
PFX	A prefix component (e.g., “Dr.”)
SFX	A suffix component (e.g., “Ph.D”)
DEL	A delimiter character used to separate components

1630 Example: The following XML fragment illustrates how the **OPR.name field** can be used to encode the operator “Dr. John Ebert.”

1635     <OPR.name V="Dr. John Ebert">  
     <FAM V="Ebert"/>  
     <GIV V="John"/>  
     <PFX V="Dr."/>  
     <SFX V="MD"/>  
   </OPR.name>

### PQ – Physical Quantity

1640 The PQ data type is used to communicate a measured value, with the units of measure. The attributes this data type may use are described in the following table. Either the ‘V’ and the ‘U’ attributes or the ‘NULL’ attribute must be specified.

**Table 72: PQ Data Type Attributes**

Field	Required	Use
V	No	Contains the string representation of the value (1)
U	No	Indicates the units of measure for the value (2)



Field	Required	Use
NULL	No	Indicates one of the values from <b>Table 70</b>

Note 1: Trailing zeros may be used in the ‘V’ attribute to indicate precision.

1645 Note 2: The HL7 “ISO+” units code set, defined in a section of the HL7 v2.5 specification, comprises the default values for the PQ units attribute. This specification defines an abbreviation for a single case unit (ISO 2955-83) plus extensions, which do not collide with ISO abbreviations.

Example of a pCO<sub>2</sub> value of 71.1 mmHg: `<OBS.value V="71.1" U="mmHg"/>`

Example of a patient’s height value of 1.85 m: `<PT.height V="1.85" U="m"/>`

### 1650 **TS – Point in time**

This data type is used to communicate a point in time. This data type may use one and only one of these two alternative attributes:

‘V’: String representation of a point in time: YYYY-MM-DDTHH:MM:SS.SSxOH:OM

1655 Where:

- YYYY = four-digit year;
- MM = two-digit month of the year;
- DD = two-digit day of the month;
- HH = 24-hour representation of the hour;
- MM = minute;
- SS.SS = second (optional decimal digits may follow the ‘.’ separator);
- x = ‘+’ if time is GMT *plus* offset; ‘-’ if time is GMT *minus* offset;
- OH = hours offset from GMT; and
- OM = minutes offset from GMT.

1665 ‘NULL’: One of the values from Table 70:

Example: The following XML fragment illustrates how a device could communicate that an observation was made on June 1, 2005 at 5:09:10 PM, in the time zone of Tokyo that is nine hours prior to GMT: `<SVC.observation_dttm V="2005-06-01T17:09:10+09:00"/>`

**Table 70: Null Code Values**

Value	Use
NI	No Information
NA	Not Applicable
UNK	Unknown
NASK	Not Asked
ASKU	Asked But Unknown
NAV	Not Available
OTH	Other
PINF	Positive Infinity

<b>Value</b>	<b>Use</b>
NINF	Negative Infinity

1670

## Appendix F – Relationship between Transactions, Messages, Events

The following tables list the combinations of message types and trigger events that can be used by transactions described in Volume 2a of the PaLM Technical Framework.

1675 OML, ORL, ORU 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, R01, R22, R23), 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.

1680 For ORU and 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 transactions [LAB-3] and [LAB-5].

**Table F-1: Placer Order Management [LAB-1]**

Transaction definition	Message type	Trigger event	Event type	HL7 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	

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Transaction definition	Message type	Trigger event	Event type	HL7 Ver2.5
		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 response to order service replace request by Order Placer (OF -> OP)	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	
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	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	

Transaction definition	Message type	Trigger event	Event type	HL7 Ver2.5
Order Placer (OF -> OP)		Laboratory order response message to a single container of a specimen OML	O36/CR O36/UC	

**Table F-2: Filler Order Management [LAB-2]**

Transaction definition	Message type	Trigger event	Event type	HL7 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	

**Table F-3: Order Results Management [LAB-3]**

Transaction definition	Message type	Trigger event	Event type	OBR-25 status	HL7 Ver2.5
Reception of specimen(s) (no results available, procedure incomplete)	OUL	Unsolicited specimen centered observation message	R22/SC	I	Chapter 7
	ORU	Unsolicited order centered observation message	R01/SC	I	
Some or all of the results available Not validated yet.	OUL	Unsolicited specimen centered observation message	R22/SC	R	
	ORU	Unsolicited order centered observation message	R01/SC	R	
Preliminary: Some of results available, validated.	OUL	Unsolicited specimen centered observation message	R22/SC	P	
	ORU	Unsolicited order centered observation message	R01/SC	P	
Final: All results available, validated	OUL	Unsolicited specimen centered observation message	R22/SC	F	
	ORU	Unsolicited order centered observation message	R01/SC	F	
Correction of final results, results final	OUL	Unsolicited specimen centered observation message	R22/SC	C	
	ORU	Unsolicited order centered observation message	R01/SC	C	

Transaction definition	Message type	Trigger event	Event type	OBR-25 status	HL7 Ver2.5
Correction of final results, some of the results not final or not available yet	OUL	Unsolicited specimen centered observation message	R22/SC	C	
	ORU	Unsolicited order centered observation message	R01/SC	C	
Deletion of battery/test in a filler order (no results available)	OUL	Unsolicited specimen centered observation message	R22/SC	X	
	ORU	Unsolicited order centered observation message	R01/SC	X	
Addition of a battery/test in an order (but not done)	OUL	Unsolicited specimen centered observation message	R22/SC	S	
	ORU	Unsolicited order centered observation message	R01/SC	S	

1685

**Table F-4: Work Order Management [LAB-4]**

Transaction definition	Message type	Trigger event	Event type	HL7 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	

Transaction definition	Message type	Trigger event	Event type	HL7 Ver2.5
		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	

**Table F-5: Test Results Management [LAB-5]**

Transaction definition	Message type	Trigger event	Event type	OBR-25 status	HL7 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	
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	
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	
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	
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	

## Appendix G – Real World Use Cases

### 1690 G.1 Guidelines

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

1695 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.

1700 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.

### G.2 Two Hematology Batteries on a Blood Specimen

#### 1705 G.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.

1710 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

1715 Ordering facility: Urology

Patient: John Ill, Patient hospital identifier: 6543210, Patient visit number: 999888, class = inpatient

Orderer: Dr. Uro

Placer order enterer: Janet Nurse



1720 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)
Work Order Step Code (1st battery)	456	Cytology laboratory (AM)
Work Order Step Code (2nd battery)	457	Cytology laboratory (AM)
Specimen	456_1	Cytology laboratory (OF)

1725

**[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.

1730

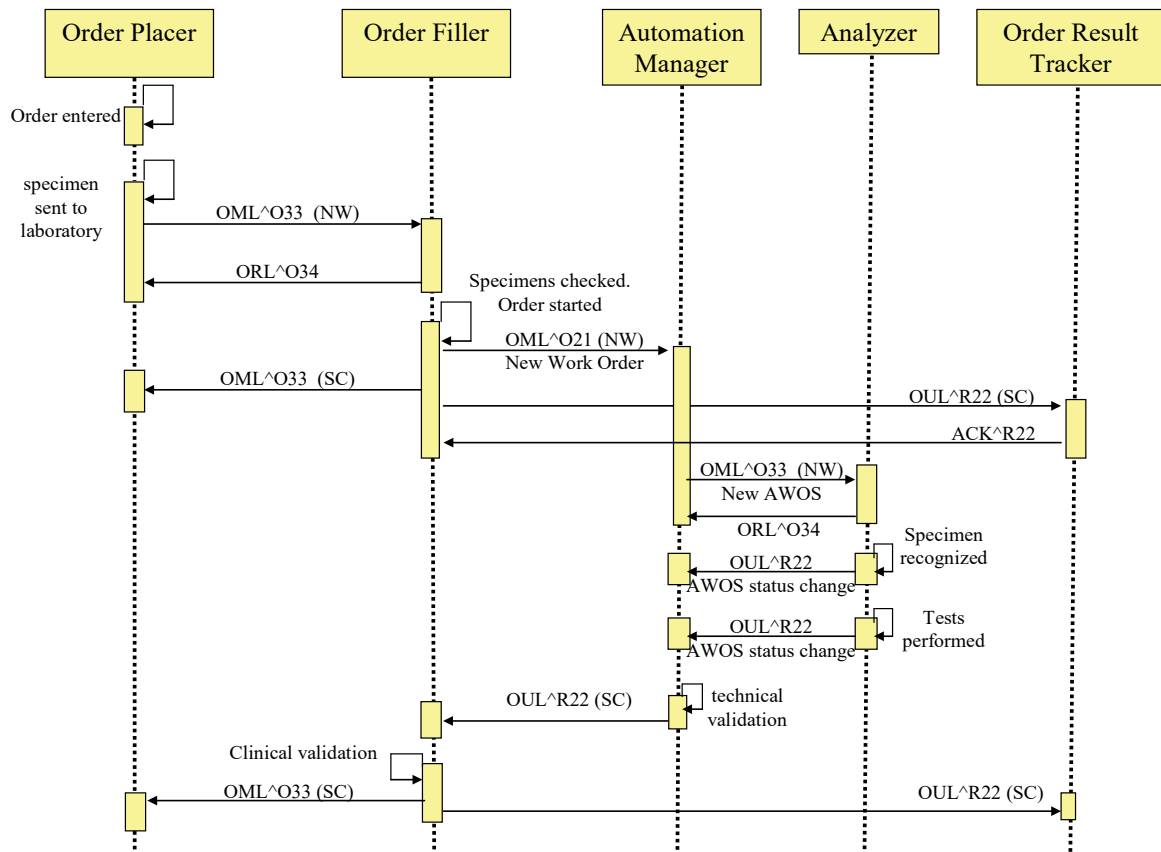
**[LAB-4], [LAB-1] and [LAB-3] interactions:** The laboratory checks the specimen and schedules the work. An identifier is assigned to the specimen by the Order Filler and the corresponding identification label is printed out. The Order Filler sends a unique work order to the Automation Manager. The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

1735

**[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.

1740 **G.2.2 Interaction Diagram**



**G.2.3 Messages**

**G.2.3.1 LAB-1 (OP → OF): Message “New order” with one Specimen**

1745 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^C4|
||||^COLLECT^JOHN|||||^URO^^^^DR
ORC|NW|9876544^Urology||555^Urology
||||200310060710|^NURSE^JANET|||||||Urology^^^^^FI^^UR01
TQ1|1|||||R
    
```

1755

1760 OBR|1|9876544^Urology||85009^Differential WBC Count, buffy coat^C4|  
||||^COLLECT^JOHN|||||^URO^^^^DR

The related acknowledgement message isn't shown.

### G.2.3.2 LAB-4 (OF → AM): Message “New order”

1765 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  
1770 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^C4|  
||||^COLLECT^JOHN|||||^URO^^^^DR  
1775 ORC|NW||555^Urology|||||200310060710|^NURSE^JANET|||||Urology^^^^^FI^^UR01  
TQ1|1|||||R  
OBR|1|457^Cytology||85009^Differential WBC Count, buffy coat^C4|  
||||^COLLECT^JOHN|||||^URO^^^^DR

1780 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  
1785 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  
1790 OBR|1|456^Cytology||85027^Hemogram and platelet count, automated^C4|  
||||^COLLECT^JOHN|S|||||^URO^^^^DR  
ORC|OK||555^Urology|SC|||||200310060710|^NURSE^JANET|||||Urology^^^^^FI^^UR01  
TQ1|1|||||R  
1795 OBR|1|457^Cytology||85009^Differential WBC Count, buffy coat^C4|  
||||^COLLECT^JOHN|S|||||^URO^^^^DR

### G.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:

1800 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

1805 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^C4|  
||||^COLLECT^JOHN|P|||||^URO^^^DR|||||||I  
1810 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^C4|  
||||^COLLECT^JOHN|P|||||^URO^^^DR|||||||I

1815

The related acknowledgement message isn't shown.

### G.2.3.4 LAB-3 (OF->ORT): Message "Order Status Change"

The Order Result Tracker is informed that a new order is being performed:

1820 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  
1825 OBR|1|9876543^Urology|456^Cytology|85027^Hemogram and platelet count, automated^C4|  
||||^COLLECT^JOHN|P|||||^URO^^^DR|||||||I  
ORC|SC|9876543^Urology|555^Urology|IP|||||200310060710|^NURSE^JANET|||||||||  
Urology^^^^^FI^^^UR01  
TQ1|1||||||R  
1830 OBR|2|9876544^Urology|457^Cytology|85009^Differential WBC Count, buffy coat^C4|  
||||^COLLECT^JOHN|P|||||^URO^^^DR|||||||I  
ORC|SC|9876544^Urology|555^Urology|IP|||||200310060710|^NURSE^JANET|||||||||  
Urology^^^^^FI^^^UR01  
TQ1|1||||||R

1835 Acknowledgement sent by the Order Results Tracker:

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

### 1840 G.2.3.5 LAB-21 (AM-> Analyzer): New AWOS

MSH|^~\&|AM|Cytology|LD|Cytology|200506121348||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  
1845 SPM|1|456 1|BLD|||||P|||||200506121330|||||||1  
ORC|NW|9876543^Urology|||||200506121315|66622^NURSE^JANET|||||||||Urology  
TQ1|1||||||R  
OBR||9876543||85027^Hemogram and platelet count, automated^C4|||||||14788^URO  
ORC|NW|9876544^Urology|||||200506121315|66622^NURSE^JANET|||||||||Urology

1850 TQ1|||||||R  
OBR||9876544||85009^Differential WBC count, buffy coat^C4|||||||14788^URO

Acknowledgement sent by the Analyzer:

1855 MSH|^~\&|LD|Cytology|AM|Cytology|200506121349||ORL^O34^ORL\_O34|101|T|2.5|||||USA|EN  
MSA|AA|001  
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^L||19810101|M  
PV1|1|I|||||||9998888  
SPM|1|456\_1||BLD  
1860 ORC|OK|9876543^Urology|||||200506121349  
OBR||9876543||85027^Hemogram and platelet count, automated^C4  
ORC|OK|9876544^Urology|||||200506121349  
OBR||9876544||85009^Differential WBC count, buffy coat^C4

### G.2.3.6 LAB-23 (Analyzer → AM): Specimen for AWOS Arrived

1865 MSH|^~\&|LD|Cytology|AM|Cytology|200506121400||OUL^R22^OUL\_R22|102|T|2.5|||||USA|EN  
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^L||19810101|M  
PV1|1|I|||||||9998888  
SPM|1|456\_1||BLD  
1870 OBR||9876543||85027^Hemogram and platelet count, automated^C4|||||||I  
ORC|SC|9876543^Urology|||||200506121400  
OBR||9876544||85009^Differential WBC count, buffy coat^C4|||||||I

Acknowledgement not shown.

1875

### G.2.3.7 LAB-23 (Analyzer → AM): Tests Performed

1880 MSH|^~\&|LD|Cytology|AM|Cytology|200506121410||OUL^R22^OUL\_R22|102|T|2.5|||||USA|EN  
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^L||19810101|M  
PV1|1|I|||||||9998888  
SPM|1|456\_1||BLD  
OBR||9876543||85027^Hemogram and platelet count, automated^C4|||||||R  
ORC|SC|9876543^Urology|||||200506121410  
1885 OBX|1|NM|11156-7^LEUKOCYTES^LN||8.2|10\*3/mm3||||R||200506121410  
OBX|2|NM|11273-0^ERYTHROCYTES^LN||4.08|10\*3/mm3||||R||200506121410  
OBX|3|NM|20509-6^HEMOGLOBIN^LN||13.4|10\*3/mm3||||R||200506121410  
OBX|4|NM|20570-8^HEMATOCRIT^LN||39.7|10\*3/mm3||||R||200506121410  
OBX|5|NM|30428-7^MVC^LN||97|10\*3/mm3||||R||200506121410  
OBX|6|NM|28539-5^MCH^LN||33.0|10\*3/mm3||||R||200506121410  
1890 OBX|7|NM|28540-3^MCHC^LN||33.8|10\*3/mm3||||R||200506121410  
OBX|8|NM|11125-2^PLATELETS^LN||220|10\*3/mm3||||R||200506121410  
OBR||9876544||85009^Differential WBC count, buffy coat^C4|||||||R  
ORC|SC|9876544^Urology|||||200506121410  
1895 OBX|1|NM|23761-0^NEUTROPHILS/100 LEUKOCYTES^LN||72|%||||R||200506121410  
OBX|2|NM|26450-7^EOSINOPHILS/100 LEUKOCYTES ^LN||2|%||||R||200506121410  
OBX|3|NM|26478-8^LYMPHOCYTES/100 LEUKOCYTES ^LN||20|%||||R||200506121410  
OBX|4|NM|26485-3^MONOCYTES/100 LEUKOCYTES ^LN||6|%||||R||200506121410

OBX|5|NM|30180-4^BASOPHILS/100 LEUKOCYTES ^LN||0%||||R|||200506121410

1900 **G.2.3.8 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  
1905 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^C4|  
||||^COLLECT^JOHN|P||||^URO^^^^DR|  
||||200310060832||F|||||&TECHOS&MARC^200310060833  
1910 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  
1915 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^C4|  
1920 ||||^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  
1925 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.

1930

**G.2.3.9 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  
1935 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  
1940 OBR|1|9876543^Urology|456^Cytology||85027^Hemogram and platelet count, automated^C4|  
||||^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  
1945 OBR|1|9876544^Urology|457^Cytology||85009^Differential WBC Count, buffy coat^C4|  
||||^COLLECT^JOHN|P||||^URO^^^^DR||||||F|||||&CYTO&JANE^200310060929

The related acknowledgement message isn't shown.

1950 **G.2.3.10 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:

1955 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  
PVI|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^C4|  
||||^COLLECT^JOHN|P||||^URO^^^^DR|  
1960 |||||200310060929||F|||||&CYTO&JANE^200310060929  
ORC|SC|9876543^Urology||555^Urology|CM|||||200310060710|^NURSE^JANET|||||||||  
Urology^^^^^FI^^^UR01  
TQ1|1||||||R  
1965 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  
1970 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^C4|  
||||^COLLECT^JOHN|P||||^URO^^^^DR|  
1975 |||||200310060929||F|||||&CYTO&JANE^200310060929  
ORC|SC|9876544^Urology||555^Urology|CM|||||200310060710|^NURSE^JANET|||||||||  
Urology^^^^^FI^^^UR01  
TQ1|1||||||R  
1980 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.

1985

**G.3 Test on a Series of Specimens: Glucose Tolerance Study**

**G.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.

1990

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’.

- 1995 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.
- 2000 Human actors and organizations participating to the process:
- Assigning authority: Memphis Hosp.
  - Placer: Entero-gastric department
  - Filler: Chemistry laboratory
  - Ordering facility: Entero-gastric
- 2005 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
- 2010 Technician: Suzy Technician, ID number 333333
- Clinical expert: Jane Chemistry-Expert, ID number 444444

ID numbers used by the workflow:

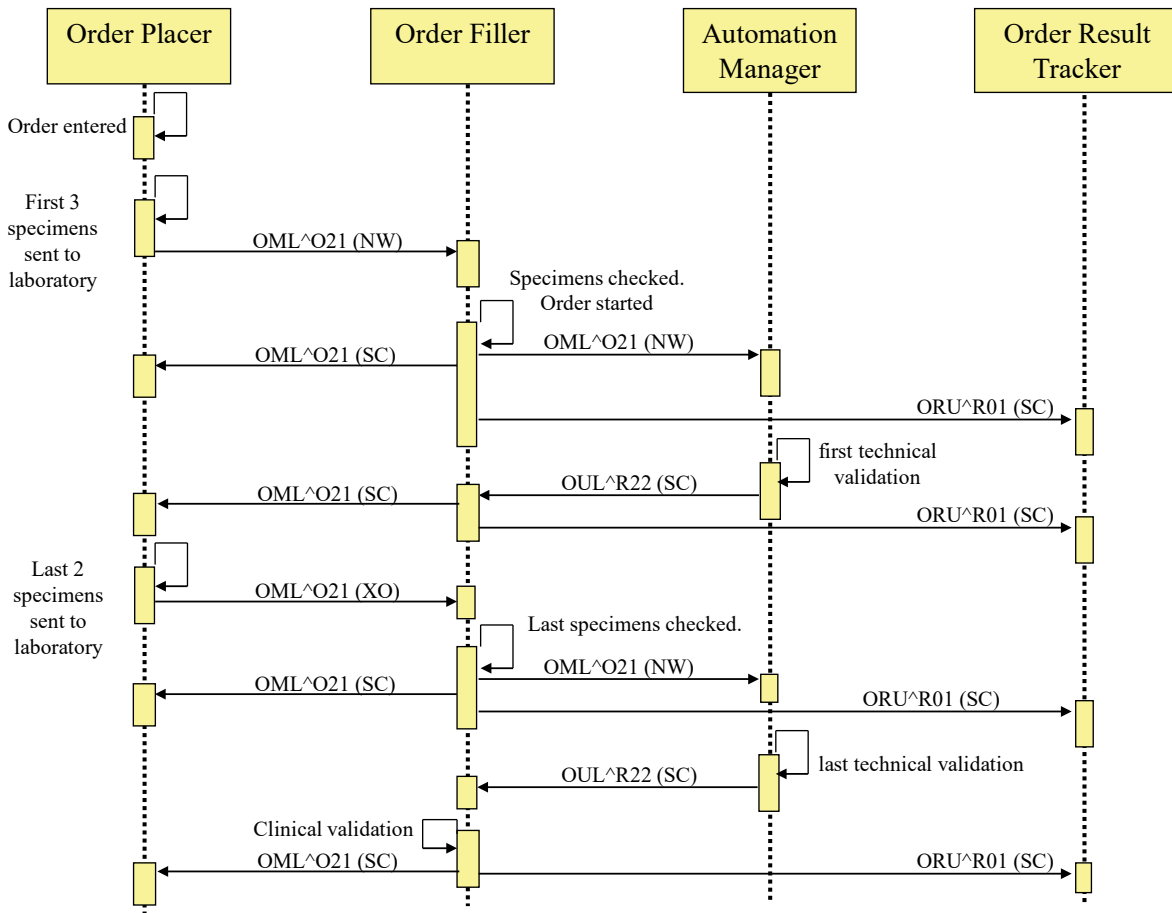
ID number	Value	Assigned by
Patient ID	12345	Admission office (ADT)
Care unit order	12345678	Entero-gastric department (OP)
Care unit order group	666	Entero-gastric department (OP)
1 <sup>st</sup> specimen	123456781	Entero-gastric department (OP)
2 <sup>nd</sup> specimen	123456782	Entero-gastric department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



ID number	Value	Assigned by
4 <sup>th</sup> work order	555_4	Chemistry laboratory (OF)

- 2015 **[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.
- 2020
- 2025 **[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.
- 2030 **[LAB-5], [LAB-1] and [LAB-3] interactions:** After technical validation, 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 results to the Order Result Tracker, and notifies the status change to the Order Placer, without waiting for the clinical validation.
- 2035 **[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.
- 2040 **[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.

2045 **G.3.2 Interaction Diagram**



**G.3.3 Messages**

**G.3.3.1 LAB-1 (OP → OF): Message “New order” with the first 3 Specimens**

2050 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.

```

2055 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|||||||Ent
ero-gastric^^^^^FI^^EG02
TQ1|||||||A
2060 OBR||12345678^gastric||82951^Glucose Tolerance Test^C4|||||1234^BLEEDER|
P|||||222222^PHYSICIAN^^^DR|821
    
```

2065 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.

### G.3.3.2 LAB-4 (OF → AM): Message “New order” with the first 2 Specimens

2070 Two new work orders sent to the Automation Manager: Priority ASAP. One observation provided.

2075 MSH|^~\&|OF|Chemistry|AM|Automation|200309060825||OML^O21^OML\_O21|msgOF101|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||666^gastric|||200309060824|222221^NURSE^NANCY|||||  
Entero-gastric^^^^^FI^^EG02  
TQ1|||||||A  
2080 OBR||555\_1^chemistry||GLUC^GLUCOSE^L|||||1234^BLEEDER|S|||||222222^PHYSICIAN^^^DR|82  
1  
SPM|1|123456781^gastric||SER|||||P|||||200309060735|200309060821|||||1  
ORC|NW||666^gastric|||200309060710|222221^NURSE^NANCY|||||  
Entero-gastric^^^^^FI^^EG02  
2085 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

2090 The related acknowledgement message isn't shown.

### G.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:

2095 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  
2100 TQ1|||||||A  
OBR||12345678^gastric|555^chemistry|82951^Glucose Tolerance Test^C4|||||  
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  
2105 SPM|3|123456783^gastric||SER|||||P|||||200309060815|200309060821|N|RB|||||1

The related acknowledgement message isn't shown.

### G.3.3.4 LAB-3 (OF → ORT): Message first Specimens accepted for an order

2110 The Order Result Tracker is informed that a new order is in process: The observation related to the 3rd specimen (unavailable) is canceled.

```
MSH|^~\&|OF|Chemistry|ORT||200309060825||ORU^R01^ORU_R01|msgOF103|T|2.5|123|||USA|EN
2115 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|22221^NURSE^NANCY
|||||Enterogastric^^^^^FI^^EG02
OBR||12345678^gastric|555^chemistry|82951^Glucose Tolerance Test^C4|||||
1234^BLEEDER|P|||||22222^PHYSICIAN^^^DR|821|||||I
2120 TQ1|||||A
OBX|1|NM|GLUCOSE||75|g||||F||200309060735
OBX|2|NM|30264-6^GLUCOSE 40M POST DOSE GLUCOSE^LN|||||X
SPM|1|123456781^gastric||SER||||P|||||200309060735|200309060821||Y|||||1
2125 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.

### G.3.3.5 LAB-5 (AM → OF): Message “New results” for the first 2 Work Orders

2130 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^R22^OUL_R22|msgAM1|T|2.5|123|||
2135 USA|EN
PID|1||12345^5^M10^Memphis_Hosp^PI||EVERYMAN^ADAM^JR^^L|19800101|M
SPM|1|123456781^gastric||SER||||P|||||200309060735|200309060821|||||1
OBR||555_1^chemistry||GLUC^GLUCOSE^L|||||1234^BLEEDER
|S|||||22222^PHYSICIAN^^^DR|821|||||200309060832|||F|||||
33333&TECHNICIAN&Suzy&&&&MEMPHIS_HOSPITAL^200309060833
2140 OBX|1|NM|14749-6^GLUCOSE^LN||4200|umol/l||N||F|||200309060830
SPM|2|123456782^gastric||SER||||P|||||200309060755|200309060821|||||1
OBR||555_2^chemistry||GLUC^GLUCOSE^L|||||1234^BLEEDER
|S|||||22222^PHYSICIAN^^^DR|821|||||200309060832|||F|||||
33333&TECHNICIAN&Suzy&&&&MEMPHIS_HOSPITAL^200309060833
2145 OBX|1|NM|14749-6^GLUCOSE^LN||6000|umol/l||N||F|||200309060832
```

The related acknowledgement message isn't shown.

### G.3.3.6 LAB-1 (OF → OP): Message “Status Changed”

2150 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
2155 PV1|1|O|Ward|||||||12345
ORC|SC|12345678^gastric||666^gastric|A||||200309060834|22221^NURSE^NANCY|
|||||Entero-gastric^^^^^FI^^EG02
TQ1|||||A
2160 OBR||12345678^gastric|555^chemistry|82951^Glucose Tolerance
Test^C4|||||1234^BLEEDER|P||||22222^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
```

2165 The related acknowledgement message isn’t shown.

### G.3.3.7 LAB-3 (OF → ORT): Message “Status Changed”

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

```
2170 MSH|^~\&|OF|Chemistry|ORT||200309060825||ORU^R01^ORU_R01|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
ORC|SC|12345678^gastric||666^gastric|A||||200309060834|22221^NURSE^NANCY|
|||||Entero-gastric^^^^^FI^^EG02
2175 OBR||12345678^gastric|^chemistry|82951^Glucose Tolerance
Test^C4|||||1234^BLEEDER|P||||22222^PHYSICIAN^^^DR|821|||||R
TQ1|||||A
OBX|1|NM|GLUCOSE||75|g||||F||||200309060735
2180 OBX|2|NM|14996-3^GLUCOSE PRE 75 G GLUCOSE PO^LN||4200|umol/l|4000-6100|N||
R||200309060755
OBX|3|NM|30263-8^GLUCOSE 20M POST DOSE GLUCOSE^LN||6000|umol/l|<7800|N||
R||200309060755
OBX|4|NM|30264-6^GLUCOSE 40M POST DOSE GLUCOSE^LN|| |||||X
2185 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^Broken
container|||||1
```

The related acknowledgement message isn’t shown.

2190

### G.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:

2195 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  
2200 TQ1|||||||A  
OBR||12345678^gastric||82951^Glucose Tolerance Test^C4|||||1234^BLEEDER|S|||||  
22222^PHYSICIAN^^^^DR|821  
OBX|1|NM|GLUCOSE||75|g|||||F|||200309060735  
2205 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

2210 The related acknowledgement message isn't shown.

### G.3.3.9 LAB-4 (OF → AM): Message “New order” with the last 2 Specimens

Two new work orders sent to the Automation Manager:

2215 MSH|^~\&|OF|Chemistry|AM|Automation|200309060905||OML^O21^OML\_O21|msgOF106|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  
2220 ORC|NW|||666^gastric|||||200309060904|222221^NURSE^NANCY|||||||  
Entero-gastric^^^^^FI^^EG02  
TQ1|||||||A  
OBR||555\_4^chemistry ||GLUC^GLUCOSE^L|||||1234^BLEEDER|  
S|||||22222^PHYSICIAN^^^^DR|821  
2225 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|||||  
22222^PHYSICIAN^^^^DR|821  
2230 SPM|1|123456785^gastric ||SER|||||P|||||200309060855|200309060902|||||||1

The related acknowledgement message isn't shown.

### G.3.3.10 LAB-1 (OF → OP): Message “Status changed” with all Specimens

2235 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  
 2240 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^C4|||||  
 2245 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  
 2250 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.

### G.3.3.11 LAB-3 (OF → ORT): Message “Status Changed”

2255 The last two specimens have been received. All the work is scheduled:  
 MSH|^~\&|OF|Chemistry|ORT||200309060905||ORU^R01^ORU\_R01|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  
 2260 ORC|SC|12345678^gastric||666^gastric|A||||200309060904|222221^NURSE^NANCY|||||||En  
 tero-gastric^^^^^FI^^EG02  
 OBR||12345678^gastric|555^chemistry|82951^Glucose Tolerance Test^C4|||||  
 1234^BLEEDER|S|||||222222^PHYSICIAN^^^DR|821||||||R  
 TQ1|||||||A  
 OBX|1|NM|GLUCOSE||75|g|||||F|||200309060735  
 2265 OBX|2|NM|14996-3^GLUCOSE PRE 75 G GLUCOSE PO^LN||4200|umol/1|4000-6100|N||  
 R|||200309060735  
 OBX|3|NM|30263-8^GLUCOSE 20M POST DOSE GLUCOSE^LN||6000|umol/1|<7800|N||  
 R|||200309060755  
 2270 OBX|4|NM|30264-6^GLUCOSE 40M POST DOSE GLUCOSE^LN|| |||||X  
 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^Broken  
 container|||||1  
 2275 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.

### G.3.3.12 LAB-5 (AM → OF): “New results” for the last 2 Work Orders

2280 The Automation Manager sends the two final results for the 2 work orders, technically validated by Suzy TECHNICIAN at 9h12.

2285 MSH|^~\&|AM|Automation|OF|Chemistry|200309060912||OUL^R22^OUL\_R22|msgAM2|  
T|2.5|123|||USA||EN  
PID|1||12345^5^M10^Memphis\_Hosp^PI||EVERYMAN^ADAM^^JR^^L|19800101|M  
SPM|1|123456784^gastric||SER|||||P|||||200309060835|200309060902|||||1  
OBR||555\_4^chemistry||30266-1^GLUCOSE 1.6H POST DOSE GLUCOSE^LN|||||1234^BLEEDER|  
S|||||22222^PHYSICIAN^^^DR|821|||||200309060911|||F|||||  
333333&TECHNICIAN&Suzy&&&&&MEMPHIS HOSPITAL^200309060912  
2290 OBX|1|NM|14749-6^GLUCOSE^LN||7200|umol/l|N|||F|||200309060910  
SPM|2|123456785^gastric||SER|||||P|||||200309060855|200309060902|||||1  
OBR||555\_5^chemistry||GLUC^GLUCOSE^L|||||1234^BLEEDER|S|||||  
22222^PHYSICIAN^^^DR|821|||||200309060911|||F|||||  
333333&TECHNICIAN&Suzy&&&&&MEMPHIS HOSPITAL^200309060912  
2295 OBX|1|NM|14749-6^GLUCOSE^LN||7100|umol/l|N|||F|||200309060911

The related acknowledgement message isn't shown.

### G.3.3.13 LAB-1 (OF → OP): Message “Status Changed”

2300 Jane CHEMISTRY-EXPERT has performed the clinical validation at 9h29. The order is completed.

2305 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|||||E  
ntero-gastric^^^FI^^EG02  
TQ1|||||A  
2310 OBR||12345678^gastric||555^chemistry||82951^Glucose Tolerance Test^C4|||||  
1234^BLEEDER|S|||||22222^PHYSICIAN^^^DR|821|||||200309060929|||F|||||  
444444&CHEMISTRY-EXPERT&Jane&&&&&MEMPHIS HOSPITAL^200309060929  
SPM|1|123456781^gastric||SER|||||P|||||200309060735|200309060821||Y|||||1  
SPM|2|123456782^gastric||SER|||||P|||||200309060755|200309060821||Y|||||1  
2315 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.

2320

### G.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.

2325 MSH|^~\&|OF|Chemistry|ORT||200309060930||ORU^R01^ORU\_R01|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



2330 ORC|SC|12345678^gastric||666^gastric|CM||||200309060929|222221^NURSE^NANCY|||||||E  
ntero-gastric^^^^^FI^^EG02  
2335 OBR||12345678^gastric|555^chemistry|82951^Glucose Tolerance Test^C4|||||  
1234^BLEEDER|S||||22222^PHYSICIAN^^^DR|821||||200309060929||E|||||  
44444&CHEMISTRY-EXPERT&Jane&&&&&MEMPHIS HOSPITAL^200309060929  
TQ1|||||||A  
OBX|1|NM|GLUCOSE||75|g||||F||200309060735  
2335 OBX|2|NM|14996-3^GLUCOSE PRE 75 G GLUCOSE PO^LN||4200|umol/l|4000-6100|N||  
F||200309060735  
OBX|3|NM|30263-8^GLUCOSE 20M POST DOSE GLUCOSE^LN||6000|umol/l|<7800|N||  
F||200309060755  
2340 OBX|4|NM|30264-6^GLUCOSE 40M POST DOSE GLUCOSE^LN|||||X  
OBX|5|NM|14756-1^GLUCOSE 1H POST DOSE GLUCOSE^LN||7200|umol/l|<7800|N||  
F||200309060835  
OBX|6|NM|30265-3^GLUCOSE 1.3H POST DOSE GLUCOSE^LN||7100|umol/l|<7800|N||  
F||200309060855  
2345 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^Broken  
container|||||1  
SPM|4|123456784^gastric ||SER|||||P|||||200309060835|200309060902||Y|||||1  
SPM|5|123456785^gastric ||SER|||||P|||||200309060855|200309060902||Y|||||1  
2350

The related acknowledgement message isn't shown.

## G.4 Battery with 2 Specimens: Creatinine clearance

### G.4.1 Storyboard

2355 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.

2360 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 measures 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:

2365 Assigning authority: Abbeville Hospital  
Placer: Nephrology department  
Filler: Chemistry laboratory  
Ordering facility: Nephrology

2370 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  
 2375 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 (1 <sup>st</sup> battery) idem for work order	654	Chemistry laboratory (OF)
Specimen Serum	654_1	Chemistry laboratory (OF)
Specimen Urine	654_2	Chemistry laboratory (OF)

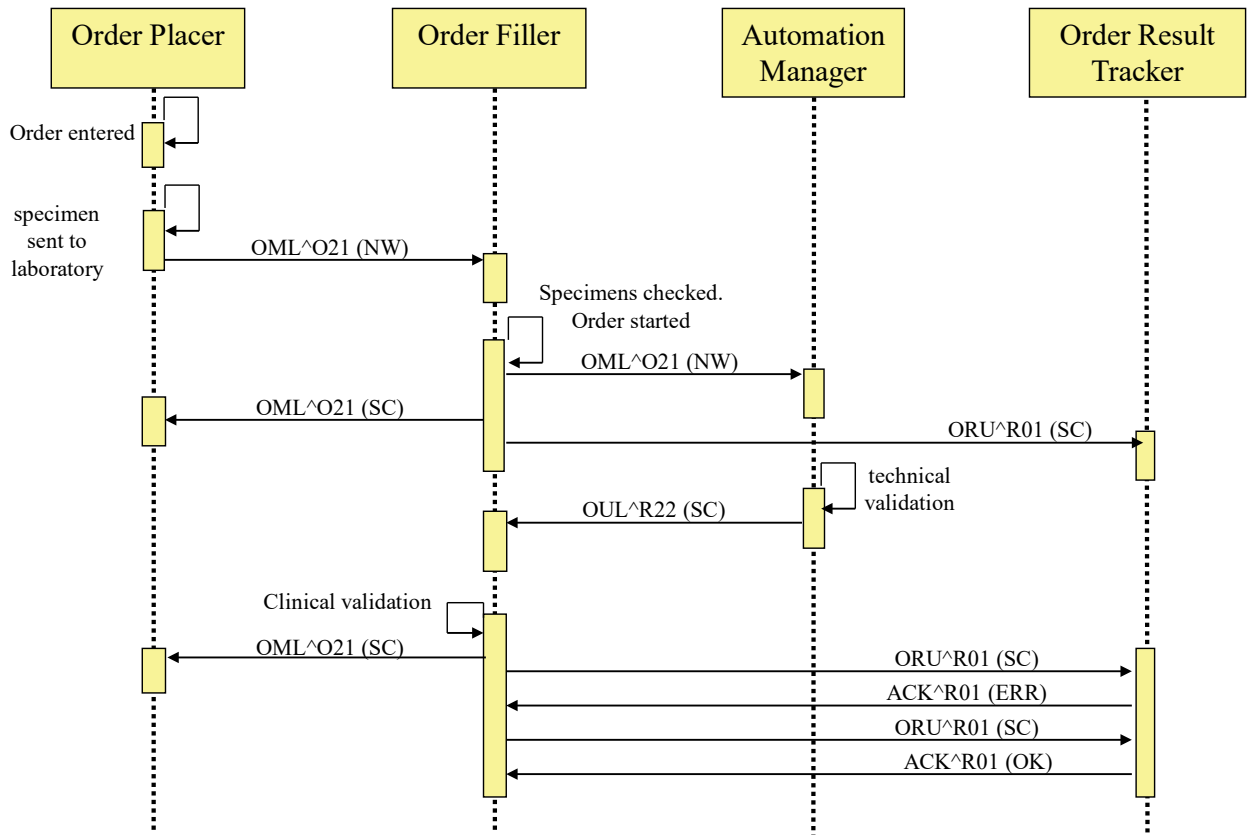
2380 **[LAB-1] interaction:** The Care Unit processes the specimen collection related to an order for a creatinine clearance, and sends the notified or measured values and the specimens to the chemistry laboratory. The Order Placer sends a message “new order” (NW) accompanying the specimen, to let the laboratory start the testing.

2385 **[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.

2390 **[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 negative acknowledgement and a repetition of the message followed by the final positive acknowledgement.

2395 **G.4.2 Interaction Diagram**



**G.4.3 Messages**

**G.4.3.1 LAB-1 (OP → OF): Message “New order” with one Specimen**

A new placer order sent to the Order Filler:

2400

```

MSH|^~\&|OP|Nephrology|OF|Chemistry|200310060820||OML^O21^OML_O21|001|T|2.5|||USA||E
N
PID|1||6543210^^^Abbeville Hospital^PI||ILL^JOHN^^^^^L||19810101|M
PV1|1|I|||||9998888
2405 ORC|NW|9876543^Nephro||777^Nephro|||||200310060710|^NURSE^JANET|||||
Nephrology^^^^^FI^^^NE03
TQ1|1|||||R
OBR|1|9876543^Nephro||82575^Creatinine clearance^C4|||||^COLLECT^JOHN|S||||
^NEPHRO^^^^DR
    
```

2410 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  
2415 ORC|NW||777^Nephro|||200310060710|^NURSE^JANET|||||Nephrology^^^^^FI^^NE03  
OBR|2|98765432^Nephro||11502-2^LABORATORY REPORT.TOTAL^LN|

The related acknowledgement message isn't shown.

#### G.4.3.2 LAB-4 (OF → AM): Message “New order”

2420 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||E  
N  
PID|1||6543210^^Abbeville Hospital^PI||ILL^JOHN^^^^L||19810101|M  
PV1|1|I|||||9998888  
2425 ORC|NW||777^Nephro|||200310060710|^NURSE^JANET|||||  
Nephrology^^^^^FI^^NE03  
TQ1|1|||||R  
OBR|1|654^chemistry||82575^Creatinine clearance^C4|||||^COLLECT^JOHN|S||||  
^NEPHRO^^^^DR  
2430 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

2435 The related acknowledgement message isn't shown.

#### G.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:

2440 MSH|^~\&|OF|Chemistry|OP|Nephrology|200310060825||OML^O21^OML\_O21|012|T|2.5|||||USA||E  
N  
PID|1||6543210^^Abbeville Hospital^PI||ILL^JOHN^^^^L||19810101|M  
PV1|1|I|||||9998888  
2445 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^C4|  
|||||^COLLECT^JOHN|P|||||^NEPHRO^^^^DR|||||I  
2450 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.

#### G.4.3.4 LAB-3 (OF->ORT): Message “Order Status Change”

2455 The Order Result Tracker is informed that a new order is being processed:

```
MSH|^~\&|OF|Chemistry|ORT||200310060825||ORU^R01^ORU_R01|013|T|2.5|||||USA||EN
PID|1||6543210^^Abbeville Hospital^PI||ILL^JOHN^^^^L||19810101|M
PV1|1|I|||||9998888
2460 ORC|SC|9876543^Nephro|777^Nephro|IP||||200310060710|^NURSE^JANET|||||
Nephrology^^^^^FI^^NE03
OBR|1|9876543^Nephro|654^chemistry|82575^Creatinine clearance^C4|
||||^COLLECT^JOHN|P||||^NEPHRO^^^DR|||||I
TQ1|1|||||R
2465 SPM|1|654_1^chemistry||SER|||||P|||||200310060735|200310060821||Y|||||1
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||2500|ml|||||F|||200309060735
```

2470 The related acknowledgement message isn't shown.

#### G.4.3.5 LAB-5 (AM->OF): Message “New Results”

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

```
2475 MSH|^~\&|AM|Automation|OF|Nephrology|200310060900||OUL^R22^OUL_R22|3331|T|2.5||||
USA||EN
PID|1||6543210^^Abbeville Hospital^PI||ILL^JOHN^^^^L||19810101|M
PV1|1|I|||||9998888
2480 SPM|1|654_1^chemistry||SER|||||P|||||200310060735|200310060821||Y|||||1
OBR|1|654^chemistry||82575^Creatinine clearance^C4|||||^COLLECT^JOHN|
P||||^NEPHRO^^^DR|||||200310060832||F|||||&TECHOS&MARC^200310060833
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
2485 OBR|1|654^chemistry||82575^Creatinine clearance^C4|||||^COLLECT^JOHN|
P||||^NEPHRO^^^DR|||||200310060832||F|||||&TECHOS&MARC^200310060833
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
```

2490 The related acknowledgement message isn't shown.

#### G.4.3.6 LAB-1 (OF->OP): Message “Status Changed”

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

```
2495 MSH|^~\&|OF|Nephrology|OP|Nephrology|200310060930||OML^O21^OML_O21|014|T|2.5||||
USA||EN
```

2500 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^C4|  
||||^COLLECT^JOHN|P||||^NEPHRO^^^^DR|||||F|||||&CYTO&JANE^200310060929  
2505 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.

### G.4.3.7 LAB-3 (OF->ORT): Message "Status Changed"

2510 The clinical expert has performed the clinical validation at 09h29. The order is completed. The results are final:

2515 MSH|^~\&|OF|Chemistry|ORT||200310060931||ORU^R01^ORU\_R01|015|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  
OBR|1|9876543^Nephro|654^chemistry|82575^Creatinine clearance^C4|||||^COLLECT^JOHN  
|P||||^NEPHRO^^^^DR|||||200310060929||F|||||&CYTO&JANE^200310060929  
2520 TQ1|1||||||R  
OBX|1|NM|2164-2^CREATININE CLEARANCE^LN||52.7|ml/min|88-174|L|S|E||200310060735  
OBX|2|NM|15045-8^SERUM CREATININE^LN||93|umol/l|50-100|N||F||200310060735  
OBX|3|NM|14684-5^24H URINE CREATININE^LN||7.06|mmol|8-16 (/24hr)|L||F||200310060830  
2525 SPM|1|654\_1^chemistry|SER|||||P|||||200310060735|200310060821||Y|||||1  
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  
ORC|SC||777^Nephro||||200805191100  
2530 OBR|2|98765432^Nephro|6542^chemistry|11502-2^LABORATORY  
REPORT.TOTAL^LN|||||||F  
OBX|1|RP|11502-2^LABORATORY REPORT.TOTAL^LN||file://hserv/lr/lr12345678.pdf|||||F||P

Negative acknowledgement sent by the Order Results Tracker:

2535 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 = 'AR' says that the incoming message has been application-rejected. In this particular case, the rejection is not related to a value not acceptable in the MSH segment, therefore the sender should repeat its message later.

2540 MSH|^~\&|ORT||OF|Cytology|200310060932||ACK^R01^ACK|401|T|2.5||||USA|EN  
MSA|AR|015  
ERR||206^Application record locked|E

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

2545 MSH|^~\&|OF|Chemistry|ORT||200310060931||ORU^R01^ORU\_R01|015|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  
OBR|1|9876543^Nephro|654^chemistry|82575^Creatinine clearance^C4|||||^COLLECT^JOHN  
|P|||||^NEPHRO^^^^DR|||||200310060929||F|||||&CYTO&JANE^200310060929  
2550 TQ1|1||||||R  
OBX|1|NM|2164-2^CREATININE CLEARANCE^LN||52.7|ml/min|88-174|L|S|F|||200310060735  
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|||200310060735  
2555 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  
ORC|SC||777^Nephro|||||200805191100  
2560 OBR|2|98765432^Nephro|6542^chemistry|11502-2^LABORATORY  
REPORT.TOTAL^LN|||||||F  
OBX|1|RP|11502-2^LABORATORY REPORT.TOTAL^LN||file://hserv/lr/lr12345678.pdf|||||F|P

Positive acknowledgement sent by the Order Results Tracker:

2565 MSH|^~\&|ORT||OF|Cytology|200310060935||ACK^R01^ACK|401|T|2.5|||||USA|EN  
MSA|AA|015

## G.5 Microbiology with Two Specimens and Three Germs Identified

### G.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).

2570 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  
2575 are grouped via the Placer Group Number '777'.

The patient is an Outpatient in Emergency ward.

2580 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.

In this storyboard, a CIS application implements both Order Placer and Order Result Tracker Actors, which suppresses the need for OML messages “Status Change” from OF to OP.

Human actors and organizations participating to the process:

2585 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),  
2590 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  
2595 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)
1 <sup>st</sup> specimen	123456791	Emergency Ward (OP)
2 <sup>nd</sup> specimen	123456701	Emergency Ward (OP)
Laboratory order for the Urine	MSU0309922	Microbiology laboratory (OF)
Laboratory order for the PUS	PUS0300666	Microbiology laboratory (OF)

2600 **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-3] interaction:** The laboratory checks the specimens and schedules the work. The Order Filler notifies Order Result Tracker of the scheduled work.

2605 **Day 1 at 14:46 [LAB-3] interaction:** After Microscopy for the Urine Specimen is achieved, the Order Filler notifies these partial results to the Order Result Tracker 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

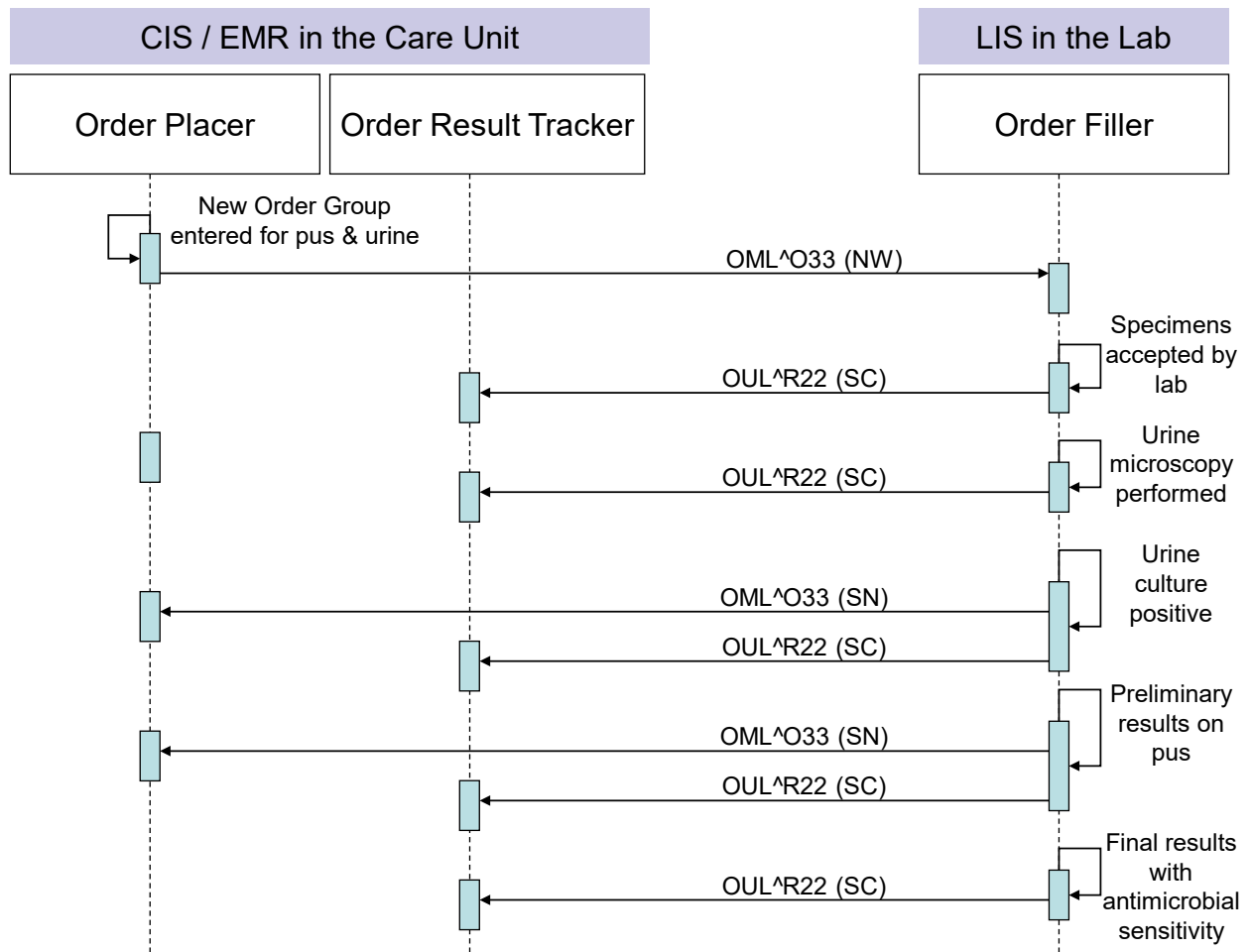


2610 tests (transaction [LAB-2]) and notifies this action to the Order Result Tracker via transaction [LAB-3].

**Day 2 at 09:45 [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  
 2615 Order Filler 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-3] interaction:** 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.

2620 **G.5.2 Interaction Diagram**



This example of microbiology workflow has selected the OUL^R22 message structure to convey the results back to the EMR system, because this specimen-centric message structure is

- 2625 particularly appropriate for microbiology results, which are usually specimen-centric, and for which the provision of specimen data is of key importance to the receiving system.
- Nevertheless, ORU^R01 could also have been used instead, providing the same specimen data in a SPECIMEN segment group at the bottom of each ORDER\_OBSERVATION segment group, as stated in Appendix C, Section C.9 OBX Observation/Result Segment. Alternative messages
- 2630 using ORU^R01 are shown on the first and last [LAB-3] interaction of this use case.

### G.5.3 Messages

#### G.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.

2635

```
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
```

2640

```
SPM|1|123456791^Emergency|MSU^Mid Stream Urine^L|||||P|||||200309060800|||||1  
ORC|NW|12345679^Emergency||777^Emergency|||||200309060800|22221^NURSE^NANCY|||||  
|Emergency Ward^^^^^FI^^EW00
```

```
TQ1|||||R
```

2645

```
OBR|1|12345679^Emergency||87086^Urine Microscopy and Culture^C4|||||  
22221^NURSE^NANCY|S|||||22222^PHYSICIAN^^^DR|
```

```
SPM|2|123456701^Emergency|PUS||||TOE|LEFT|P|||||200309060805|||||1
```

```
ORC|NW|12345670^Emergency||777^Emergency|||||200309060800|22221^NURSE^NANCY|||||  
|Emergency Ward^^^^^FI^^EW00
```

```
TQ1|||||R
```

2650

```
OBR|1|12345670^Emergency||87040^Microscopy and Culture^C4|||||22221^NURSE^NANCY  
|S|||||22222^PHYSICIAN^^^DR|
```

The related acknowledgement message isn't shown.

2655

#### G.5.3.2 LAB-3 (OF → ORT): Message “Order Status Change”

Day 1 at 8:20 The Order Result Tracker is informed that the laboratory has accepted the specimens for a new microbiology order:

2660

```
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|...
```

2665

```
OBR|1|12345679^Emergency|MSU030922^Micro|87086^Urine Microscopy and Culture^C4|||||  
||||22222^PHYSICIAN^^^DR|||||I
```

```
ORC|SC|12345679^Emergency||777^Emergency|IP|||||200309060818|||||  
Emergency Ward^^^^^FI^^EW00
```

```
SPM|2|123456701^Emergency|PUS||||TOE|LEFT|P|||||200309060805|200309060818||Y|...
```

2670

```
OBR|1|12345670^Emergency|PUS0300666^Micro|87040^Microscopy and  
Culture^C4|||||22221^NURSE^NANCY|||||22222^PHYSICIAN^^^DR|||||I
```

```
ORC|SC|12345670^Emergency||777^Emergency|IP|||||200309060818|||||  
Emergency Ward^^^^^FI^^EW00
```

2675

The related acknowledgement message isn't shown.

### G.5.3.3 LAB-3 (OF → ORT): Message “Status Changed”

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

```
2680 MSH|^~\&|OF|Microbiology|ORT||200309061446||OUL^R22^OUL_R22|msgOF14|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
2685 SPM|1|123456791^Emergency|MSU^Mid Stream
Urine^L||||P||||200309060800|200309060818||Y...
OBR|1|12345679^Emergency|MSU0309922^Micro|87086^Urine Microscopy and Culture^C4|||||
||||22222^PHYSICIAN^^^DR|||||MB|A
ORC|SC|12345679^Emergency||777^Emergency|A||||200309060818|||||
Emergency Ward^^^^^FI^^EW00
2690 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
2695 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.

The same content could also have been provided using this ORU^R01 message:

```
2700 MSH|^~\&|OF|Microbiology|ORT||200309060820||ORU^R01^ORU_R01|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
2705 ORC|SC|12345679^Emergency||777^Emergency|IP||||200309060818|||||
Emergency Ward^^^^^FI^^EW00
OBR|1|12345679^Emergency|MSU0309922^Micro|87086^Urine Microscopy and Culture^C4|||||
||||22222^PHYSICIAN^^^DR|||||I
SPM|1|123456791^Emergency|MSU^Mid Stream
2710 Urine^L||||P||||200309060800|200309060818||Y...
ORC|SC|12345670^Emergency||777^Emergency|IP||||200309060818|||||
Emergency Ward^^^^^FI^^EW00
OBR|1|12345670^Emergency|PUS0300666^Micro|87040^Microscopy and
Culture^C4|||||22221^NURSE^NANCY|||||22222^PHYSICIAN^^^DR|||||I
2715 SPM|1|123456701^Emergency|PUS||||TOE|LEFT|P||||200309060805|200309060818||Y|...
```

### G.5.3.4 LAB-2(OF → OP): Message “Send Order Number”

Day 2 at 9:40 Urine Culture is positive with two microorganisms detected, not identified yet. Reflex tests Organism Identification and two Antimicrobial Susceptibility batteries are added.

2720 For each, a placer order number is requested from the Order Placer, within Placer Group Number 777^Emergency.

```
MSH|^~\&|OF|Microbiology|OP|Emergency Ward|200309070940||OML^O33^OML_O33|msgOF15|
```

2725 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|||||  
2730 Emergency Ward^^^^^FI^^EW00  
OBR|1||MSU0309221^Micro|87088^Organism Identification^C4|||||  
G|||||222222^PHYSICIAN^^^DR|||||MB  
ORC|SN||777^Emergency|||||200309070938|333231^BACK^TERRY|||||Emergency  
Ward^^^^^FI^^EW00  
2735 OBR|2||MSU0309222^Micro|87186^Antibiotic Susceptibility^C4|||||  
G|||||222222^PHYSICIAN^^^DR|||||MB  
ORC|SN||777^Emergency|||||200309070938|333231^BACK^TERRY|||||Emergency  
Ward^^^^^FI^^EW00  
2740 OBR|3||MSU0309223^Micro|87186^Antibiotic Susceptibility^C4|||||  
G|||||222222^PHYSICIAN^^^DR|||||MB

**Acknowledgement sent by the Order Placer:**

MSH|^~\&|OP|Emergency  
2745 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|...  
2750 ORC|NA|12345681^Emergency||777^Emergency|||||200309070938|333231^BACK^TERRY|||||  
Emergency Ward^^^^^FI^^EW00  
OBR|1||12345681^Emergency|MSU0309221^Micro|87088^Organism Identification^C4|||||  
G|||||222222^PHYSICIAN^^^DR|||||MB  
ORC|NA|12345682^Emergency||777^Emergency|||||200309070938|333231^BACK^TERRY|||||  
2755 Emergency Ward^^^^^FI^^EW00  
OBR|2||12345682^Emergency|MSU0309222^Micro|87186^Antibiotic Susceptibility^C4|||||  
G|||||222222^PHYSICIAN^^^DR|||||MB  
ORC|NA|12345683^Emergency||777^Emergency|||||200309070938|333231^BACK^TERRY|||||  
2760 Emergency Ward^^^^^FI^^EW00  
OBR|3||12345683^Emergency|MSU0309223^Micro|87186^Antibiotic Susceptibility^C4|||||  
G|||||222222^PHYSICIAN^^^DR|||||MB

**G.5.3.5 LAB-3 (OF → ORT): Message “Status Changed”**

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

2765 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|||USA||  
EN  
2770 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|MSU030922^Micro|87086^Urine Microscopy and Culture^C4|||||  
|||||222222^PHYSICIAN^^^DR|||||MB|R

2775 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  
2780 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  
2785 OBR|2|12345681^Emergency|MSU03099221^Micro|87088^Organism Identification^C4|||||  
G||||22222^PHYSICIAN^^^DR|||||MB|S  
ORC|SC|12345681^Emergency|777^Emergency|IP|||||200309070938|333231^BACK^TERRY|||||  
||Emergency Ward^^^^^FI^^EW00  
2790 OBR|3|12345682^Emergency|MSU03099222^Micro|87186^Antibiotic Susceptibility^C4|||||  
G||||22222^PHYSICIAN^^^DR|||||MB|S  
ORC|SC|12345682^Emergency|777^Emergency|IP|||||200309070938|333231^BACK^TERRY|||||  
||Emergency Ward^^^^^FI^^EW00  
OBR|4|12345683^Emergency|MSU03099223^Micro|87186^Antibiotic Susceptibility^C4|||||  
G||||22222^PHYSICIAN^^^DR|||||MB|S  
2795 ORC|SC|12345683^Emergency|777^Emergency|IP|||||200309070938|333231^BACK^TERRY|||||  
||Emergency Ward^^^^^FI^^EW00

The related acknowledgement message isn't shown.

### 2800 G.5.3.6 LAB-2(OF → OP): Message “Send Order Number”

Day 2 at 9:45 Culture for Pus specimen is positive, reflex tests Organism Identification and Antibiotic Susceptibility are added. For each, a placer order number is requested from the Order Placer, within Placer Group Number 777^Emergency.

2805 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  
2810 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||PUS03006661^Micro|87088^Organism Identification^C4|||||  
G||||22222^PHYSICIAN^^^DR|||||MB  
ORC|SN||777^Emergency|||||200309070941|333231^BACK^TERRY|||||  
2815 Emergency Ward^^^^^FI^^EW00  
OBR|2||PUS03006662^Micro|87186^Antibiotic Susceptibility^C4|||||  
G||||22222^PHYSICIAN^^^DR|||||MB

Acknowledgement sent by the Order Placer:

2820 MSH|^~\&|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|...

2825 ORC|NA|12345685^Emergency||777^Emergency|||||200309070941|333231^BACK^TERRY|||||||  
Emergency Ward^^^^^FI^^EW00  
OBR|1|12345685^Emergency|PUS03006661^Micro|87088^Organism Identification^C4|||||  
G|||||222222^PHYSICIAN^^^DR|||||||MB  
ORC|NA|12345686^Emergency||777^Emergency|||||200309070941|333231^BACK^TERRY|||||||  
2830 Emergency Ward^^^^^FI^^EW00  
OBR|2|12345686^Emergency|PUS03006662^Micro|87186^Antibiotic  
Susceptibility^C4|||||||G|||||222222^PHYSICIAN^^^DR|||||||MB

### G.5.3.7 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.

2835 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.

2840 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|...  
2845 OBR|1|12345670^Emergency|PUS0300666^Micro|87040^Microscopy and Culture^C4|||||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  
2850 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|PUS03006661^Micro|87088^Organism Identification^C4|||||G|||||MB|S  
ORC|SC|12345685^Emergency||777^Emergency|IP|||||200309070941|333231^BACK^TERRY|||||||Emergency  
Ward^^^^^FI^^EW00  
2855 OBR|3|12345686^Emergency|PUS03006662^Micro|87186^Antibiotic Susceptibility^C4|||||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.

### G.5.3.8 LAB-3 (OF → ORT): Message “Status Changed”

2860 Day 3 at 11:32 Mike ROSCOP has performed the clinical validation at 11h30. Final results are transmitted.

Note: This message is conforming to the requirements given in Section C.11 “Microbiology Reporting Rules”. In particular: Grouping of the results per microorganism using Observation Sub-ID (OBX-4), and association of antimicrobial sensitivity and microorganism identified, based on the parent/child mechanism: Parent Result (OBR-26) & Parent (OBR-29). Classification of the results (OBX) below an OBR per microorganism.

2865

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



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2870 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^C4|||||  
||||22222^PHYSICIAN^^^DR|||||MB|F|||||444642&ROSCOP&Mike^200309081130

2875 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|...  
2880 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|12345681^Emergency|MSU03099221^Micro|87088^Organism Identification^C4|||||  
2885 |||||MB|F|||||444642&ROSCOP&Mike^200309081130  
ORC|SC|12345681^Emergency||777^Emergency|CM|||||200309070938|333231^BACK^TERRY|||||  
||Emergency Ward^^^^^FI^^EW00  
OBX|1|ST|11475-1^Micro organism identified^LN|1|E. Coli||N|||F|||...  
OBX|2|ST|11475-1^Micro organism identified^LN|2|Strepto D||N|||F|||...  
2890 OBR|3|12345682^Emergency|MSU03099222^Micro|87186^Antibiotic Susceptibility^C4  
|||||MB|F||11475-1&Micro organism identified&LN^1^E. Coli||  
12345681&Emergency^MSU03099221&Micro||444642&ROSCOP&Mike^200309081130  
ORC|SC|12345682^Emergency||777^Emergency|CM|||||200309070938|333231^BACK^TERRY|||||  
||Emergency Ward^^^^^FI^^EW00  
2895 OBX|1|SN|18861-5^Amoxicillin^LN|1|>=^0.512|ug/ml||R|||F|||200309081107|...  
OBX|2|SN|18864-9^Ampicillin^LN|1|<^0.128|ug/ml||I|||F|||200309081107|...  
OBX|3|SN|18952-2^Nalidixate^LN|1|>=^2.0|ug/ml||R|||F|||200309081107|...  
OBX|4|SN|18956-3^Norfloxacin^LN|1|value|ug/ml||I|||F|||200309081107|...  
OBX|5|SN|18928-2^Gentamicin^LN|1|<^0.032|ug/ml||S|||F|||200309081107|...  
2900 OBX|6|SN|25596-8^Fosfomycine^LN|1|<^0.1|ug/ml||S|||F|||200309081107|...  
OBX|7|SN|18955-5^Nitrofuranton^LN|1|<^0.25|ug/ml||S|||F|||200309081107|...  
OBR|4|12345683^Emergency|MSU03099223^Micro|87186^Antibiotic Susceptibility^C4  
|||||MB|F||11475-1&Micro organism identified&LN^2^Strepto D||  
12345681&Emergency^MSU03099221&Micro||444642&ROSCOP&Mike^200309081130

2905 ORC|SC|12345683^Emergency||777^Emergency|CM|||||200309070938|333231^BACK^TERRY|||||  
||Emergency Ward^^^^^FI^^EW00  
OBX|8|SN|18965-4^Penicillin G^LN|2|<^0.5|ug/ml||S|||F|||200309081107|...  
OBX|9|SN|18861-5^Amoxicillin^LN|2|value|ug/ml||S|||F|||200309081107|...  
OBX|10|SN|18864-9^Ampicillin^LN|2|value|ug/ml||S|||F|||200309081107|...  
2910 OBX|11|SN|18928-2^Gentamicin^LN|2|value|ug/ml||R|||F|||200309081107|...  
OBX|12|SN|18917-5^Doxycycline^LN|2|value|ug/ml||R|||F|||200309081107|...  
OBX|13|SN|18919-1^Erythromycin^LN|2|value|ug/ml||R|||F|||200309081107|...  
OBX|14|SN|18974-6^Rifampicin^LN|2|value|ug/ml||S|||F|||200309081107|...  
OBX|15|SN|18938-1^Lincomycin^LN|2|value|ug/ml||R|||F|||200309081107|...  
2915 SPM|2|123456701^Emergency||PUS||||TOE|LEFT|P|||||200309060805|200309060818||Y|...  
OBR|1|12345670^Emergency|PUS0300666^Micro|87040^Microscopy and  
Culture^C4|||||222221^NURSE^NANCY  
|||||222222^PHYSICIAN^^^DR|||||MB|F|||||444642&ROSCOP&Mike^200309081130

2920 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  
2925 OBR|2|12345685^Emergency|PUS03006661^Micro|87072^Organism  
Identification^C4|||||MB|F|||||444642&ROSCOP&Mike^200309081130



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2930 ORC|SC|12345685^Emergency||777^Emergency|CM|||200309070941|333231^BACK^TERRY|||||||  
||Emergency Ward^^^^^FI^^EW00  
OBX|1|ST|21020-3^Micro organism identified^LN|1|Staph Aureus|||N|||F| ||200309080830|...  
OBR|3|12345686^Emergency|PUS03006662^Micro|87186^Antibiotic  
Susceptibility^C4|||||||MB|F|21020-3&Micro organism  
identified&LN^1^Staph Aureus||  
12345685&Emergency^PUS03006661&Micro|||444642&ROSCOP&Mike^200309081130  
2935 ORC|SC|12345686^Emergency||777^Emergency|CM|||200309070938|333231^BACK^TERRY|||||||  
||Emergency Ward^^^^^FI^^EW00  
OBX|1|SN|18928-2^Gentamicin^LN|1|value|ug/ml||S|||F|||200309080830|...  
OBX|2|SN|18996-9^Tobramycin^LN|1|value|ug/ml||R|||F|||200309080830|...  
OBX|3|SN|18954-8^Netilmicin^LN|1|value|ug/ml||S|||F|||200309080830|...  
2940 OBX|4|SN|18959-7^Ofloxacin^LN|1|value|ug/ml||S|||F|||200309080830|...  
OBX|5|SN|18917-5^Doxycycline^LN|1|value|ug/ml||S|||F|||200309080830|...  
OBX|6|SN|19000-9^Vancomycin^LN|1|value|ug/ml||S|||F|||200309080830|...  
OBX|7|SN|18974-6^Rifampicin^LN|1|value|ug/ml||S|||F|||200309080830|...  
OBX|8|SN|25596-8^Fosfomycine^LN|1|value|ug/ml||S|||F|||200309080830|...

2945 The related acknowledgement message isn't shown.

The same content could also have been provided using this ORU^R01 message:

2950 MSH|^~\&|OF|Microbiology|ORT||200309081132||ORU^R01^ORU\_R01|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  
ORC|SC|12345679^Emergency||777^Emergency|CM|||200309060818|||||||Emergency  
Ward^^^^^FI^^EW00  
2955 OBR|1|12345679^Emergency|MSU0309922^Micro|87086^Urine Microscopy and Culture^C4|||||  
|||22222^PHYSICIAN^^^DR|||||MB|F|||444642&ROSCOP&Mike^200309081130  
TQ1|||||R  
OBX|1|CE|20453-7^Epithelial Cells^LN||value||N|||F|||200309061445| |333231^BACK^TERRY  
2960 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|...  
2965 SPM|1|123456791^Emergency||MSU^Mid Stream  
Urine^L|||||P|||||200309060800|200309060818||Y|...  
ORC|SC|12345681^Emergency||777^Emergency|CM|||200309070938|333231^BACK^TERRY|||||||  
||Emergency Ward^^^^^FI^^EW00  
OBR|2|12345681^Emergency|MSU03099221^Micro|87088^Organism Identification^C4|||||  
|||||MB|F|||444642&ROSCOP&Mike^200309081130  
2970 OBX|1|ST|11475-1^Micro organism identified^LN|1|E. Coli|||N|||F|||...  
OBX|2|ST|11475-1^Micro organism identified^LN|2|Strepto D|||N|||F|||...  
SPM|1|123456791^Emergency||MSU^Mid Stream  
Urine^L|||||P|||||200309060800|200309060818||Y|...  
2975 ORC|SC|12345682^Emergency||777^Emergency|CM|||200309070938|333231^BACK^TERRY|||||||  
||Emergency Ward^^^^^FI^^EW00  
OBR|3|12345682^Emergency|MSU03099222^Micro|87186^Antibiotic Susceptibility^C4  
|||||MB|F|11475-1&Micro organism identified&LN^1^E. Coli|||  
12345681&Emergency^MSU03099221&Micro|||444642&ROSCOP&Mike^200309081130  
OBX|1|SN|18861-5^Amoxicillin^LN|1|>=^0.512|ug/ml||R|||F|||200309081107|...

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2980 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|...  
2985 OBX|7|SN|18955-5^Nitrofuranton^LN|1|<^0.25|µg/ml||S||F||200309081107|...  
SPM|1|123456791^Emergency||MSU^Mid Stream  
Urine^L|||||P|||||200309060800|200309060818||Y|...  
ORC|SC|12345683^Emergency||777^Emergency|CM||||200309070938|333231^BACK^TERRY|||||  
||Emergency Ward^^^^^FI^^EW00  
2990 OBR|4|12345683^Emergency|MSU03099223^Micro|87186^Antibiotic Susceptibility^C4  
|||||MB|F|11475-1&Micro organism identified&LN^2^Strepto D||  
12345681&Emergency^MSU03099221&Micro||444642&ROSCOP&Mike^200309081130  
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|...  
2995 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|...  
3000 OBX|15|SN|18938-1^Lincomycin^LN|2|value|µg/ml||R||F||200309081107|...  
SPM|1|123456791^Emergency||MSU^Mid Stream  
Urine^L|||||P|||||200309060800|200309060818||Y|...  
ORC|SC|12345670^Emergency||777^Emergency|CM||||200309060818|||||Emergency  
Ward^^^^^FI^^EW00  
3005 OBR|1|12345670^Emergency|PUS0300666^Micro|87040^Microscopy and  
Culture^C4|||||222221^NURSE^NANCY  
|||||22222^PHYSICIAN^^^^DR|||||MB|F|||||444642&ROSCOP&Mike^200309081130  
OBX|1|CE|32761-9^Leukocytes^LN||value||N||F||200309060830  
3010 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  
SPM|2|123456701^Emergency||PUS||||TOE|LEFT|P|||||200309060805|200309060818||Y|...  
ORC|SC|12345685^Emergency||777^Emergency|CM||||200309070941|333231^BACK^TERRY|||||  
||Emergency Ward^^^^^FI^^EW00  
3015 OBR|2|12345685^Emergency|PUS03006661^Micro|87072^Organism  
Identification^C4|||||MB|F|||||444642&ROSCOP&Mike^200309081130  
OBX|1|ST|21020-3^Micro organism identified^LN|1|Staph Aureus||N||F||200309080830|...  
SPM|2|123456701^Emergency||PUS||||TOE|LEFT|P|||||200309060805|200309060818||Y|...  
ORC|SC|12345686^Emergency||777^Emergency|CM||||200309070938|333231^BACK^TERRY|||||  
||Emergency Ward^^^^^FI^^EW00  
3020 OBR|3|12345686^Emergency|PUS03006662^Micro|87186^Antibiotic  
Susceptibility^C4|||||MB|F|21020-3&Micro organism  
identified&LN^1^Staph Aureus||  
12345685&Emergency^PUS03006661&Micro||444642&ROSCOP&Mike^200309081130  
3025 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|...  
3030 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|...  
SPM|2|123456701^Emergency||PUS||||TOE|LEFT|P|||||200309060805|200309060818||Y|...

## **G.6 Rejection of a Specimen**

### **3035 G.6.1 Storyboard**

This example corresponds to the use case described in Volume 1 as “4.2.4 Order Filler rejects a specimen prior to result testing”. The context for this use-case will be based on the simplification of having the actors OP and ORT grouped.

3040 A physician in a ward requests a laboratory test “BG\_CLAIR\_CREAT\_COCKROFT” for a patient “Marge Smith”.

The Order Placer sends a [LAB-1] “order create” message to the Order Filler, delivering the Order Group “2011122446\_OPGN” with associated relevant information including a Specimen with bar coded id = “1200000808”

3045 Upon reception, the Order Filler application accepts the content of the Order, and notifies a Filler Order Number in the acknowledgement message sent back to the Order Placer application.

Using the Order Filler application, the laboratory staff checks each Order with the corresponding specimens and detects a non-conformity for a particular specimen: “1200000808”. The specimen will be cancelled in the Order Filler application. During the cancellation of the specimen, a reason will be asked to allow feedback towards a Nurse or the Physician.

3050 This action will also lead to the cancelation of the related laboratory test.

The Order Filler informs the Order Placer / Order Result Tracker about the rejection executing the laboratory test

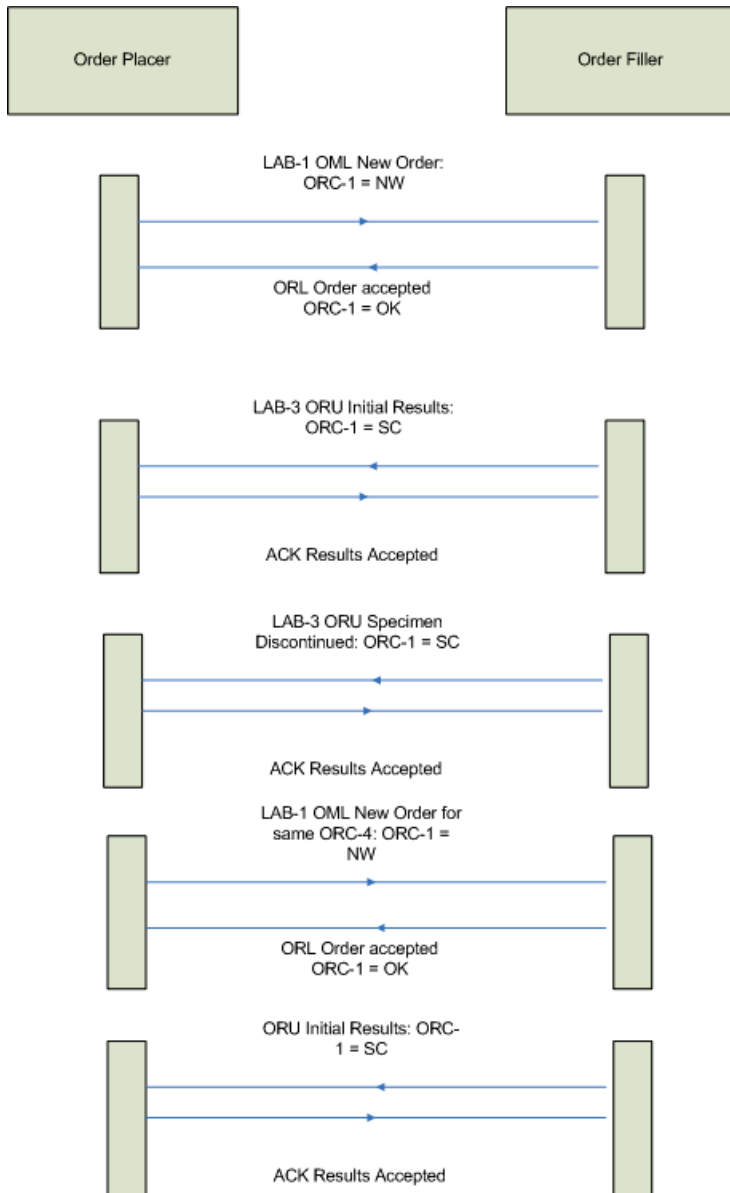
A nurse or the Physician detects this non-conformity and decides to take a new specimen sample from the patient to enable the laboratory fulfilling the laboratory test.

3055 The Order Placer will inform the Order Filler about this new Specimen with new barcode id = “1200000809” and re-order the laboratory test within the already existing Order Group.

The Order Filler will update the Order Group and provide a status feedback to the Order Result Tracker informing about the new work for this new specimen.

### **G.6.2 Interaction Diagram**

3060



### G.6.3 Messages

#### G.6.3.1 LAB-1 (OP -> OF): Message "Create new order"

3065

```
MSH|^~\&|||APHP_CORDIER|20111213174100||OML^O21^OML_O21|391815247250212427|P|2.5|||
|
PID|1||7501052489^^^PSL||Smith^Marge^^^Mrs||19641120|F|||^AMAREINS FRANCHELEINS
CESSEINS^^^01090^100
```

3070

```
PV1||I|||||JC0000407|||||20120203101100|||||v
```

3075 ORC|NW|2011122446\_OP1^APHP||2011122446\_OPGN^APHP|SC|||20111213173234|||0607^Hart^Andre  
e^^^^Dr^hcpr|0607\_N^^^^^^^^MIPSN|||S\_CORDIER^BIOCH\_HEMATO^L  
TQ1|||||R  
OBR|1|2011122446\_OP1^APHP||APHP\_CREA\_COCKROFT^APHP|||||0607^Hart^Andre^^^^Dr^h  
cpr|||||S\_CORDIER|S  
SPM|1|1200000808&PSL||MAT\_HEPLIG\_PLA^Plasma sur tube héparine lithium avec  
gel^L^APHP\_HEPLIG\_PLA^APHP|||||0.0^ml&&L|||||20120210101100|||

3080 With:  
Order Group number (ORC) = 2011122446\_OPGN  
Order Placer number (ORC) = 2011122446\_OP1  
Order Placer assigned specimen number (SPM) = 1200000808

The related acknowledgement message isn't shown.

3085

### G.6.3.2 LAB-3 (OF -> ORT/OP) : Acceptance of the order

3090 MSH|^~\&|PSL|E\_BG\_CORDIER|ORBIS|ResultImport|20120209112212||ORU^R01^ORU\_R01|303900235  
622598969|P|2.5|||BEL|8859/1|EN  
PID|1||7501052489^^^PSL||Smith^Marge||19641120|F  
PV1||I|||||JC0000407|||||20120203101100|||||V  
ORC|SC|2011122446\_OP1^ORBIS|41498^PSL|2011122446\_OPGN^ORBIS|SC|||20120209111827|||060  
7\_N^BIOCHIMIE^^^^dept^MIPSN|0607|||S\_CORDIER^BIOCH\_HEMATO^L  
3095 OBR|1|2011122446\_OP1^ORBIS|41498^PSL|BG\_CLAIR\_CREAT\_COCKROFT^Clairance créat  
Cockroft^L^APHP\_CREA\_COCKROFT^APHP||20120210101100|||||0607\_N^BIOCHIMIE^^^^dept  
t^MIPSN|||||S\_CORDIER|S  
TQ1|||||R  
SPM|1|1200000808&ORBIS^1200000808&PSL||MAT\_HEPLIG\_PLA^Plasma sur tube héparine lithium  
avec gel^L^APHP\_HEPLIG\_PLA^APHP|||||0.0^ml&&L|""|||20120210101100|||N

3100 With:  
Order Group number = 2011122446\_OPGN  
Order Placer number = 2011122446\_OP1  
Order Filler number = 41498  
3105 Order Placer assigned specimen number = 1200000808  
Order Filler assigned specimen number = 1200000808

The related acknowledgement message isn't shown.

### 3110 G.6.3.3 LAB-3 (OF -> ORT/OP) : Rejection of a specimen

3115 MSH|^~\&|PSL|E\_BG\_CORDIER|ORBIS|ResultImport|20120209122308||ORU^R01^ORU\_R01|469731566  
7455003249|P|2.5|||BEL|8859/1|EN  
PID|1||7501052489^^^PSL||Smith^Marge||19641120|F  
PV1||I|||||JC0000407|||||20120203101100|||||V  
ORC|SC|2011122446\_OP1^ORBIS|41498^PSL|2011122446\_OPGN^ORBIS|CA|||20120209111827|||060  
7\_N^BIOCHIMIE^^^^dept^MIPSN|0607|||S\_CORDIER^BIOCH\_HEMATO^L

3120 OBR|1|2011122446\_OP1^ORBIS|41498^PSI|BG\_CLAIR\_CREAT\_COCKROFT^Clairance créat  
Cockroft^L^APHP\_CREA\_COCKROFT^APHP||20120210101100|||||0607\_N^BIOCHIMIE^^^^^dep  
t^MIPSN|||||S\_CORDIER|X  
TQ1|||||R  
3125 SPM|1|1200000808&ORBIS^1200000808&PSL||MAT\_HEPLIG\_PLA^Plasma sur tube héparine lithium  
avec  
gel^L^APHP\_HEPLIG\_PLA^APHP|||||0.0^ml&&L|""||20120210101100|20120209113217||N|^N  
on Conformite  
OBX|1|ST|POIDS^Poids du patient^L^A1652^APHP||Non  
Conformite|kg^L||N~N||X||20120210101100|E\_BG\_CORDIER^BIOCH\_URG\_CORDIER^L||^L|INTEG  
RA\_01^L|20120209121943  
3130 OBX|2|ST|CREAT^Créatinine^L^A0094^APHP||Non Conformite|umol/l^L|44-  
80|N~N||X||20120210101100|E\_BG\_CORDIER^BIOCH\_URG\_CORDIER^L||^L|INTEGRA\_01^L|2012020  
9121943  
OBX|3|ST|CLCOCK^Clairance Créatinine Cockroft^L^A2154^APHP||Non  
Conformite|ml/min^L||N~N||X||20120210101100|E\_BG\_CORDIER^BIOCH\_URG\_CORDIER^L||^L|C  
ALCUL\_BG^L|20120209121942  
3135 With:  
Placer Group number = 2011122446\_OPGN  
Order Placer number = 2011122446\_OP1  
3140 Order Placer assigned specimen number = 1200000808  
Specimen Availability (SPM-20) = N  
Specimen Reject Reason (SPM-21) = Non Conformite

The related acknowledgement message isn't shown.

3145 **G.6.3.4 LAB-1 (OP->OF): 'New Order' with new specimen for same order group**

MSH|^~\&|PSL|E\_BG\_CORDIER|ORBIS|ResultImport|20120209140214||ORU^R01^ORU\_R01|537296337  
8993344693|P|2.5||||BEL|8859/1|EN  
3150 PID|1|7501052489^^^PSL||Smith^Marge||19641120|F  
PV1||I|||||JC0000407|||||20120203101100|||||V  
ORC|SC|2011122447\_OP1^ORBIS|41499^PSL|2011122446\_OPGN^ORBIS|SC||||20120209123701|||060  
7\_N^BIOCHIMIE^^^^^dept^MIPSN|0607||||S\_CORDIER^BIOCH\_HEMATO^L  
OBR|1|2011122447\_OP1^ORBIS|41499^PSI|BG\_CLAIR\_CREAT\_COCKROFT^Clairance créat  
3155 Cockroft^L^APHP\_CREA\_COCKROFT^APHP||20120210101100|||||0607\_N^BIOCHIMIE^^^^^dep  
t^MIPSN|||||S\_CORDIER|S  
TQ1|||||R  
SPM|1|1200000809&ORBIS^1200000809&PSL||MAT\_HEPLIG\_PLA^Plasma sur tube héparine lithium  
avec gel^L^APHP\_HEPLIG\_PLA^APHP|||||0.0^ml&&L|""||20120210101100||N  
3160 With:  
Order group number = 2011122446\_OPGN  
Order Placer number = 2011122447\_OP1  
Order Placer assigned specimen number = 1200000809

3165 The related acknowledgement message isn't shown.

## **Glossary**

The IHE Glossary can be found as an appendix to the *IHE Technical Frameworks General Introduction* published on [this page](#).

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