

HL7 Conformance Statement

Syngo Carbon Workflow **VA12A**



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1 Introduction

1.1 Purpose

This document gives a compact view of the HL7 interface provided by Syngo Carbon Workflow.

1.2 Audience

This document is intended for hospital staff, health system integrators, software designers, or implementers. It is assumed that the reader has a working knowledge of HL7.

1.3 Definitions, Terms and Abbreviations

1.3.1 Abbreviations

The following abbreviations are used in this document:

ASCII	American Standard Code for Information Interchange
IIE	Intelligo Interface Engine
HL7	Health Level Seven
V2	Health Level Seven Version 2
OSI	Open Systems Interconnect, a model to describe defined layers in a network operating system
HIS	Hospital Information System
RIS	Radiology Information System
PACS	Picture Archiving and Communication System
GPI	Global Patient Identifier
ACK	HL7 Acknowledgement

1.3.2 Definition and Terms

- **IIE:** Intelligo Integration Engine is the integration engine used to control HL7 communication between health systems, e.g. HIS, RIS, PACS etc.
- **HL7:** It is a standard for information exchange between medical applications. It is an abbreviation of "Health Level Seven", 7th OSI layer protocol for the health environment. The HL7 protocol defines the format and the content of the messages that applications must pass to one another under various conditions (e.g., to pass the message between applications / systems that a patient has been admitted in a hospital).
- **HL7 Version 2:** HL7's Version 2.x (V2) messaging standard is the workhorse of electronic data exchange in the clinical domain and arguably the most widely implemented standard for healthcare in the world. This messaging standard allows the exchange of clinical data between systems. It is designed to support a central patient care system, as well as a more distributed environment where data resides in departmental systems.

2 General Information

Syngo Carbon Workflow can receive and process various kinds of HL7 messages. Syngo Carbon Workflow also provides the means to generate and send HL7 messages to inform third-party system about changes. Note that HL7 message types, segments, fields, components, and subcomponents which are not mentioned in the following chapters are ignored and hence not evaluated by Syngo Carbon Workflow. The HL7 Messaging Standard strictly differentiates between the insertion and update of information. However, since it is generally inconvenient or impossible for systems to decide whether information must be inserted or updated, Syngo Carbon Workflow treats HL7 messages which insert or update information depending on the existence of the underlying objects (e.g. patients, visits, orders). Therefore, if Syngo Carbon Workflow receives an HL7 message to insert an object which already exists, the information of the object is updated. Conversely, if Syngo Carbon Workflow receives an HL7 message to update the information of an unknown object, the corresponding object is inserted.

Character Limit

For some of the listed HL7 segments, fields, components, or subcomponents, a character limit is listed. This indicates that the corresponding value is stored in the Syngo Carbon Workflow databases, which limits the number of characters that can be used to define it. If the length of a given value exceeds the defined limit, the provided information cannot be stored and the HL7 message cannot be processed (although an ACK will still be sent in this case, the message will end up on the Error Queue of the Intelligo Interface Engine). If the length of a given value is not stated, the information is not stored in the databases, although it might be needed to process the HL7 message correctly.

Additional Information

This document consolidates the information required by the subsystems of Syngo Carbon Workflow. For additional information on these subsystems, refer to **SmartReports - HL7 Manual** and **syngo.share HL7ConformanceStatement** (please reach out to Siemens support to acquire these documents).

3 Overview

Syngo Carbon Workflow utilizes the Intelligo Integration Engine (IIE) to control the flow of HL7 messages. The IIE receives, transforms, and processes messages to various endpoints to make data available to the necessary applications.

4 HL7 Configuration

4.1 Minimal Lower Layer Message Transport Protocol (MLLP)

HL7 defines three types of special wrapping characters that enclose an HL7 message:

Name	Symbol	Suggested Value (HEX)	Purpose
Start Block	<SB>	0x0B	Marks the beginning of a message (immediately precedes the MSH segment).
End Block	<EB>	0x1C	Marks the end of a message.
Carriage Return	<CR>	0x0D	Also marks the end of a message (follows the End Block).

These characters wrap a message like so: <SB>MSH|...sample...<EB><CR>

As noted in the table above, the HL7 specification defines hex characters 0x1C0D as the default separator sequence between multiple messages in the same transmission. Intelligo allows this value to be configured in cases of noncompliance. The Intelligo HL7 device does not require a start block character to be present when receiving messages. This device instead simply looks for the separator sequence when reading messages from the input stream. Therefore, a sending system may safely send messages with or without a start block. However, all HL7 messages sent from the Intelligo HL7 Device will include a start block character. This includes acknowledgments.

4.2 Sending Messages to Syngo Carbon Workflow

4.2.1 TCP/IP Communication – HL7 Device

HL7 message communication is handled by the Intelligo Integration Engine (IIE). Intelligo is a Java (JDK) based system and makes use of the standard Java socket communication libraries for access to network resources. The Intelligo HL7 device uses TCP/IP to communicate HL7 messages as defined in Chapter 2 of the HL7 2.5 specification. There are default values recommended for the sending/receiving ports. However, the sending/receiving ports are configurable, and you can define specific values at the time of integration. Intelligo supports receiving messages over multiple connections. However, it is recommended that a single TCP/IP connection be opened for a RIS, and that the same connection be maintained and reused for as long as possible. It is expected that each HL7 message transmitted will be constructed using the basic message formation rules outlined in Chapter 2 of the HL7 specifications (version 2.5). Also, each message must be terminated with a message separator sequence according to the Minimal Lower Layer Protocol (MLLP).

4.3 Sending Messages out of Syngo Carbon Workflow

HL7 messages will be sent outbound to the RIS in the following scenarios:

- When Syngo Carbon Workflow receives DICOM images, it will generate an image notification in the form of an HL7 ORU message. This message will be received by Intelligo and will be forwarded to the RIS.
- If the Medical Check feature of Syngo Carbon Workflow is enabled, a message will be triggered outbound to the RIS when MedCheck details are modified within Syngo Carbon Workflow.

4.4 Patient ID Matching

To uniquely identify a patient, the combination of Patient ID (PID-3.1.1) and Patient Assigning Authority (PID-3.4.1) is used.

4.5 Supported Character sets

The following character sets are supported by Syngo Carbon Workflow:

- US-ASCII
- ISO-8859-1
- UTF-8 (recommended)

5 HL7 Version 2 (V2.5)

This chapter describes the details of the communication supported in V2 by Syngo Carbon Workflow.

5.1 Versions Supported

This document follows the “Conformance” methodology defined in Chapter 2 of the HL7 specification, version 2.5. The scope of this document only covers those elements of the HL7 Standard which are applicable to Syngo Carbon Workflow.

5.2 Implementation Details

ACK Behavior

The IIE supports Original Mode Acknowledgement. As per the HL7 specification regarding acknowledgement, Intelligo “may acknowledge the message after placing it in an input queue, expecting to fully process the order into its database at a future time. The only assumption is that the input queue is maintained at the same level of integrity as the database.”

Intelligo immediately responds to a message with an Application Acknowledgment when all of the following steps are completed:

- Validate that the HL7 message is well formed and does not contain invalid characters.
- Store the message to the received queue (this is a persistent queue).

This ACK does not imply that the data elements in the inbound message have been properly processed and inserted into the database, it simply guarantees delivery of the message(s).

Application Acknowledgement Codes include:

- AA – Accept
- AR – Reject
- AE – Error

ACK Formation

In accordance with the HL7 2.5 specification, Intelligo uses the following logic when constructing an HL7 ACK message.

The MSH segment in the response is constructed anew following the rules used to create the initial message described above. In particular, MSH-7 (date/time of message) and MSH-10 (message control ID) refer to the response message. They are not echoes of the fields in the initial message. MSH-5 (receiving application), MSH-6 (receiving facility), and MSH-11 (processing ID) contain values that are copied from MSH-3 (sending application), MSH-4 (sending facility), and MSH-11 (processing ID) in the initiating message.

In all the responses described above, the following values are put in the MSA segment:

Field	Notes
MSA-1: acknowledgment code	AA – Accept AR – Reject AE – Error
MSA-2: message control ID	MSH-10 (message control ID) from MSH segment of incoming message.
MSA-3: message text	further describes an error condition

Invalid Characters

The IIE will not process a message and return an error ACK(AE) when any of the below control characters are present in an HL7 message:

Symbol	HEX Value	Symbol	HEX Value	Symbol	HEX Value
NUL	0x00	BS	0x08	DC4	0x14
SOH	0x01	FF	0x0C	NAK	0x15
STX	0x02	SO	0x0E	SYN	0x16
ETX	0x03	SI	0x0F	ETB	0x17
EOT	0x04	DLE	0x10	CAN	0x18
ENQ	0x05	DC1	0x11	EM	0x19
ACK	0x06	DC2	0x12	SUB	0x1A
BEL	0x07	DC3	0x13	ESC	0x1B
GS	0x1D	RS	0x1E	US	0x1F

HL7 Escaping

The IIE supports HL7 escape sequences. The default escape character is "\", however the appropriate escape character will be read from the MSH.2 field per message. All other escape sequences not mentioned below will be ignored and stored into the corresponding database field. The following HL7 escape sequences are supported by Intelligo.

Sequence Name	Purpose
\F\	Field Separator - Represents the field separator character (usually " ")
\S\	Component Separator - Represents the component separator character (usually "^")
\T\	Subcomponent Separator - Represents the subcomponent separator character (usually "&")
\R\	Repetition Separator - Represents the repetition separator character (usually "~")
\E\	Escape Character - Represents the escape character (usually "\")
\Xdddd\ or \Xdd\	Hexadecimal Data - Represents a character defined by its hexadecimal value. Example: \X0047\ is the letter "G". This can also be escaped as \X47\.

Message Structure Notation

The following notation will be used when defining the segment definition for the structure of an HL7 message:

[] – segments within square brackets are optional.

{ } – segments within curly brackets are repeatable. If multiple segments are within the same set of curly brackets, they can be repeated only in the specified grouping.

Segments that are not within brackets are required.

- Example: MSH PID PV1 [IN1] {ORC OBR ZDS {[ZKV]} [ZMC] {[NTE]}}
- MSH, PID, and PV1 are required.
- IN1 is optional.
- ORC, OBR, and ZDS are required, and repeatable as a group.
- ZKV is optional and repeatable within the grouping.
- ZMC is optional within the grouping.
- NTE is optional and repeatable within the grouping.

6 HL7 Inbound Interface

6.1 Patient and Visit Administration (ADT)

6.1.1 ADT Trigger Events

To administer patients and visits via HL7 ADT messages, Syngo Carbon Workflow supports the following ADT trigger events:

- **A01, A02, A06, A07, A08**
 - These trigger events are used to insert or update a patient and visit.
 - An HL7 ADT message for these trigger events must conform to the following structure:
 - MSH PID [PV1] [{AL1}] [IN1]
- **A31**
 - This trigger event allows the XAD-PID of referenced patients to be set if the message contains one patient ID marked with type GPI as the XAD-PID
 - An HL7 ADT message for this trigger events must conform to the following structure:
 - MSH PID
- **A18, A34, A40**
 - These trigger events are used to merge patient records.
 - An HL7 ADT message for these trigger events must conform to the following structure:
 - MSH PID MRG

6.2 ORM - GENERAL CLINICAL ORDER MESSAGE (Event O01)

6.2.1 ORM Trigger Events

To administer orders via HL7 ORM messages, Syngo Carbon Workflow only supports the **O01** trigger event. The ORM^O01 must conform to the following structure:

- MSH PID PV1 [IN1] [{AL1}] {ORC OBR ZDS {[ZKV]} [ZMC] {[NTE]} [CTD]} [{DG1}]

6.3 OMI – IMAGING ORDER MESSAGE (EVENT O23)

6.3.1 OMI Trigger Events

To administer orders via HL7 OMI messages, Syngo Carbon Workflow only supports the **O23** trigger event. The OMI^O23 must conform to the following structure:

- MSH PID PV1 [{AL1}] [IN1] {ORC OBR {[ZKV]} IPC [ZMC] {[NTE]} [CTD]} [{DG1}]

6.4 Medical Document Management (MDM)

6.4.1 MDM Trigger Events

To exchange documents via HL7 MDM messages, Syngo Carbon Workflow supports the **T02, T09, T10, and T11** trigger events.

- **Original Document Notification and Content (Event T02)**
- **Document Replacement Notification (Event T09)**
- **Document Replacement Notification and Content (Event T10)**
- **Document Cancel Notification (Event T11)**

For trigger events T02 and T10, HL7 MDM messages must comply with the following structure:

- MSH PID [PV1] [{ORC OBR}] TXA {OBX}

For trigger events T09 and T11, HL7 MDM messages must comply with the following structure:

- MSH PID [PV1] [{ORC OBR}] TXA [{OBX}]

NOTE: For a generic medical document to be displayed as a prior report in the Patient Jacket and Reporting Task, the following data must be sent:

OBR-18.1.1 must contain the accession number.

The **TXA-2** must contain the following values:

HL7 Element	HL7 Element Name	Optionality	Repeatable	Content (if specified, must contain this value)
TXA-2.1.1	Generic Medical Document Type ID	Required	No	DI
TXA-2.2.1	Generic Medical Document Type Description	Required	No	Diagnostic Imaging Report
TXA-2.3.1	Generic Medical Document Type Coding System ID	Required	No	HL70270

A **second OBX** segment must appear after the first OBX segment that contains the generic file information. It must contain the following values:

HL7 Element	HL7 Element Name	Optionality	Repeatable	Content (if specified, must contain this value)
OBX-1.1.1	Set ID	Optional	No	
OBX-2.1.1	Value Type	Required	No	HD
OBX-3.1.1	Observation Identifier	Required	No	113014
OBX-3.2.1		Required	No	DICOM Study
OBX-3.3.1		Required	No	DCM
OBX-5.1.1	Study Instance UID	Required	No	
OBX-11.1.1	Document Result Status	Required	No	O

6.5 HL7 Segments Inbound

This section lists the segments that will be used by Syngo Carbon Workflow.

6.5.1 MSH Segment

HL7 Element	HL7 Element Name	Character Limit	Optionality	Repeatable	Notes
MSH-1	Field Separator		Required	No	
MSH-2	Encoding Characters		Required	No	
MSH-3.1.1	Sending Application	100	Required	No	
MSH-4.1.1	Sending Facility	100	Required	No	This value will be used as the Organizational Unit (Producer) that is associated to the Requested Procedure
MSH-5.1.1	Receiving Application	100	Required	No	
MSH-6.1.1	Receiving Facility	100	Required	No	
MSH-7.1.1	Date/Time of Message		Required	No	
MSH-9.1.1	Message Type	3	Required	No	
MSH-9.2.1	Trigger Event	3	Required	No	
MSH-10.1.1	Message Control ID	100	Required	No	
MSH-11.1.1	Processing ID		Required	No	Supported values: "T" - Test. Messages get written to the test queue and do not get sent outbound. "P" - Production. Messages go through all valid mappings and outbound routes.
MSH-12.1.1	HL7 Version ID		Optional	No	

6.5.2 PID Segment

HL7 Element	HL7 Element Name	Character Limit	Optionality	Repeatable	Notes
PID-3.1.1	Patient ID	45	Required	Yes	
PID-3.4.1	Patient ID Assigning Authority	50	Required		
PID-3.4.2	Patient ID Universal ID	200	Required		e.g. "999.999.999"
PID-3.4.3	Patient ID Universal ID Type	15	Required		e.g. "ISO"
PID-3.5.1	Patient ID Type	3	Required		PI or PN: Used when PID-3.1 specifies the patient ID. • NH, NI, or SS: Used when PID-3.1 specifies an alternate patient ID. – NI indicates that the alternate patient ID represents a unique national identifier. – NH indicates that the alternate patient ID represents a national health service number. – SS indicates that the alternate patient ID represents a social security number -- Only 1 of these alternate ID types can be stored against a given patient If PID-3.5 contains the value GPI, then PID-3.1 will be the XAD-PID, and all patient IDs of the message are linked with this XAD-PID (GPI must be processed via ADT^A31)
PID-5.1.1	Patient Last Name	50	Required	Yes	
PID-5.2.1	Patient First Name	50	Optional		
PID-5.3.1	Patient Middle Name	50	Optional		
PID-5.4.1	Patient Name Suffix	50	Optional		
PID-5.5.1	Patient Name Prefix	50	Optional		

PID-5.7.1	Patient Name Type Code		N/A		Will process into the system as primary/legal name
PID-5.8.1	Patient Name Representation Code	1	Optional		A: Alphabetic I: Ideographic P: Phonetic Will default to A if not provided
PID-7.1.1	Patient Date/Time of Birth	datetime	Optional	No	Will trim to just the YYYYMMDD. This is to avoid data mismatches with DICOM. If the DICOM is also supplying the Patient Birth Time, the IIE HL7 integration will need to be modified to keep in sync with the DICOM.
PID-8.1.1	Patient Gender Code	1	Optional	No	Will auto-create new values via HL7

6.5.3 PV1 Segment

HL7 Element	HL7 Element Name	Character Limit	Optionality	Repeatable	Notes
PV1-2.1.1	Patient Class Code	3	Optional	No	Will auto-create new values via HL7
PV1-3.1.1	Patient Location Point of Care	64	Optional	No	
PV1-3.4.1	Patient Location Name	64	Optional	No	
PV1-3.10.1	Patient Location ID	50	Optional	No	If empty, will attempt to use PV1-3.4.1, followed by PV1-3.1.1
PV1-3.10.2	Patient Location ID Assigning Authority	50	Conditional	No	Required when processing the Patient Location ID
PV1-8.1.1	Referring Provider ID	45	Optional	No	
PV1-8.2.1	Referring Provider Last Name	50	Conditional	No	Required when processing the Referring Provider ID

PV1-8.3.1	Referring Provider First Name	50	Optional	No	
PV1-8.4.1	Referring Provider Middle Name	50	Optional	No	
PV1-8.5.1	Referring Provider Name Suffix	50	Optional	No	
PV1-8.6.1	Referring Provider Name Prefix	50	Optional	No	
PV1-8.9.1	Referring Provider Assigning Authority	50	Conditional	No	Required when processing the Referring Provider ID
PV1-15.1.1	Ambulatory Status Code		Optional	No	Currently, the only accepted value is "B9", to indicate the patient is pregnant
PV1-17.1.1	Admitting Provider ID	45	Optional	No	
PV1-17.2.1	Admitting Provider Last Name	50	Conditional	No	Required when processing the Admitting Provider ID
PV1-17.3.1	Admitting Provider First Name	50	Optional	No	
PV1-17.4.1	Admitting Provider Middle Name	50	Optional	No	
PV1-17.5.1	Admitting Provider Name Suffix	50	Optional	No	
PV1-17.6.1	Admitting Provider Name Prefix	50	Optional	No	
PV1-17.9.1	Admitting Provider Assigning Authority	50	Conditional	No	Required when processing the Admitting Provider ID
PV1-19.1.1	Visit ID	64	Optional	No	
PV1-19.4.1	Visit Assigning Authority	50	Optional	No	
PV1-20.1.1	Financial Class	255	Optional	No	

6.5.4 DG1 Segment

HL7 Element	HL7 Element Name	Character Limit	Optionality	Repeatable	Notes
DG1-3.1.1	Diagnosis Identifier	45	Required	No	
DG1-3.2.1	Diagnosis Description		Optional	No	
DG1-3.3.1	Diagnosis Type	3	Optional	No	The following values are supported: "RF" – Risk Factor "Hx" – Medical Alerts "Sx" – Signs and Symptoms "Dx" – Diagnosis

6.5.5 AL1 Segment

HL7 Element	HL7 Element Name	Character Limit	Optionality	Repeatable	Notes
AL1-2.1.1	Allergen Type Code	20	Required	No	
AL1-2.2.1	Allergen Type Description	255	Required	No	
AL1-3.2.1	Allergen Description	255	Optional	No	
AL1-4.1.1	Allergy Severity Code	20	Required	No	
AL1-4.2.1	Allergy Severity Description	255	Required	No	
AL1-5.1.1	Allergy Reaction Code	15	Optional	Yes	
AL1-6.1.1	Identification Date/Time	datetime	Optional	No	
AL1-10.1.1	Allergy Source System ID	45	Required	No	

6.5.6 IN1 Segment

HL7 Element	HL7 Element Name	Character Limit	Optionality	Repeatable	Notes
IN1-15.1.1	Insurance Plan Type	255	Optional	No	

6.5.7 MRG Segment

HL7 Element	HL7 Element Name	Character Limit	Optionality	Repeatable	Notes
MRG-1.1.1	Prior Patient ID	45	Required	No	
MRG-1.4.1	Prior Patient ID Assigning Authority	50	Required	No	
MRG-1.4.2	Prior Patient ID Universal ID	200	Required	No	e.g. "999.999.999"
MRG-1.4.3	Prior Patient ID Universal ID Type	15	Required	No	e.g. "ISO"
MRG-1.5.1	Prior Patient ID Type	3	Required	No	See PID-3.5.1

6.5.8 ORC Segment

HL7 Element	HL7 Element Name	Character Limit	Optionality	Repeatable	Notes
ORC-1.1.1	Order Control Code	2	Required	No	
ORC-2.1.1	Placer Order Id	45	Required	No	
ORC-2.2.1	Placer Order Assigning Authority	50	Required	No	
ORC-3.1.1	Filler Order Id	64	Required	No	
ORC-3.2.1	Filler Order Assigning Authority	50	Required	No	
ORC-3.3.1	Filler Order Universal ID	200	Required	No	e.g. "999.999.999"
ORC-3.4.1	Filler Order Universal ID Type	15	Required	No	e.g. "ISO"
ORC-5.1.1	Order Status	3	Required	No	Code Table: Order Status Code

ORC-9.1.1	Ordered Date/Time	datetime	Optional	No	Will be used only when ORC-1 = "NW". Cannot be updated.
ORC-13.1.1	Ordering Location Point of Care	40	Optional	No	
ORC-13.4.1	Ordering Location Name	40	Optional	No	
ORC-13.10.1	Ordering Location ID	50	Optional	No	If empty, will attempt to use ORC-13.4.1, followed by ORC-13.1.1
ORC-13.10.2	Ordering Location ID Assigning Authority	50	Conditional	No	Required when processing the Ordering Location ID
ORC-25.1.1	Reporting Workflow Status Code	4	Optional	No	Code Table: Reporting Workflow Status Code If not sent in the message, will default to "N" (New) for new orders (ORC-1="NW")
ORC-27.1.1	Placer Order Scheduled Date/Time	datetime	Required	No	If empty, will try to pull from ORC-7.4.1, followed by ORC-7.1.1

6.5.9 OBR Segment (for ORM Messages)

HL7 Element	HL7 Element Name	Character Limit	Optionality	Repeatable	Notes
OBR-1.1.1	Set ID		Optional	No	
OBR-4.1.1	Universal Service Identifier Code	45	Required	No	
OBR-4.2.1	Universal Service Identifier Description	128	Required	No	
OBR-4.3.1	Universal Service Identifier Assigning Authority	50	Required	No	
OBR-5.1.1	Clinical Priority Code	20	Required	No	Will auto-create new values via HL7 Code Table: Priority Code
OBR-6.1.1	Exam Begun Date/Time	datetime	Optional	No	Date/time that the exam was started. Will only be processed on "In Progress" status messages.

OBR-13.1.1	Relevant Clinical Information	999	Optional	No	
OBR-15.4.1	Body Part Code	20	Optional	No	Will auto-create new values via HL7
OBR-16.1.1	Ordering Provider ID	45	Optional	No	
OBR-16.2.1	Ordering Provider Last Name	50	Conditional	No	Required when processing the Ordering Provider ID
OBR-16.3.1	Ordering Provider First Name	50	Optional	No	
OBR-16.4.1	Ordering Provider Middle Name	50	Optional	No	
OBR-16.5.1	Ordering Provider Name Suffix	50	Optional	No	
OBR-16.6.1	Ordering Provider Name Prefix	50	Optional	No	
OBR-16.9.1	Ordering Provider Assigning Authority	50	Conditional	No	Required when processing the Ordering Provider ID
OBR-18.1.1	Accession Number	64	Required	No	Will attempt to populate this field from the first not null value of the following fields: OBR-18.1.1, ORC-3.1.1, OBR-3.1.1
OBR-19.1.1	Requested Procedure ID	16	Required	No	This must be consistent across all messaging from all systems to avoid errors Will attempt to populate this field from the first not null value of the following fields: OBR-19.1.1, ORC-3.1.1, OBR-3.1.1
OBR-20.1.1	Scheduled Procedure Step ID	16	Required	No	This must be consistent across all messaging from all systems to avoid errors Will attempt to populate this field from the first not null value of the following fields: OBR-20.1.1, ORC-3.1.1, OBR-3.1.1
OBR-21.1.1	Scheduled Station AE Title	255	Optional	No	
OBR-22.1.1	Result Date/Time	datetime	Optional	No	

OBR-24.1.1	Modality Code	4	Optional	No	
OBR-25.1.1	Result Status Code	3	Optional	No	
OBR-31.1.1	Reason For Study	255	Optional	No	
OBR-32.1.1	Principal Result Interpreter ID	45	Optional	No	
OBR-32.1.2	Principal Result Interpreter Last Name	50	Conditional	No	Required when processing the Principal Result Interpreter ID
OBR-32.1.3	Principal Result Interpreter First Name	50	Optional	No	
OBR-32.1.4	Principal Result Interpreter Middle Name	50	Optional	No	
OBR-32.1.5	Principal Result Interpreter Name Suffix	50	Optional	No	
OBR-32.1.6	Principal Result Interpreter Name Prefix	50	Optional	No	
OBR-32.1.9	Principal Result Interpreter Assigning Authority	50	Conditional	No	Required when processing the Principal Result Interpreter ID
OBR-33.1.1	Assistant Result Interpreter ID	45	Optional	No	
OBR-33.1.2	Assistant Result Interpreter Last Name	50	Conditional	No	Required when processing the Assistant Result Interpreter ID
OBR-33.1.3	Assistant Result Interpreter First Name	50	Optional	No	
OBR-33.1.4	Assistant Result Interpreter Middle Name	50	Optional	No	
OBR-33.1.5	Assistant Result Interpreter Name Suffix	50	Optional	No	
OBR-33.1.6	Assistant Result	50	Optional	No	

	Interpreter Name Prefix				
OBR-33.1.9	Assistant Result Interpreter Assigning Authority	50	Conditional	No	Required when processing the Assistant Result Interpreter ID
OBR-34.1.1	Performing Technician ID	45	Optional	No	
OBR-34.1.2	Performing Technician Last Name	50	Conditional	No	Required when processing the Performing Technician ID
OBR-34.1.3	Performing Technician First Name	50	Optional	No	
OBR-34.1.4	Performing Technician Middle Name	50	Optional	No	
OBR-34.1.5	Performing Technician Name Suffix	50	Optional	No	
OBR-34.1.6	Performing Technician Name Prefix	50	Optional	No	
OBR-34.1.9	Performing Technician Assigning Authority	50	Conditional	No	Required when processing the Performing Technician ID
OBR-36.1.1	Procedure Step Start Date/Time	datetime	Required	No	If empty, will try to pull from OBR-27.4.1, followed by OBR-27.1.1
OBR-44.1.1	Procedure Code	45	Optional	No	
OBR-44.2.1	Procedure Description	128	Optional	No	
OBR-44.3.1	Procedure Assigning Authority	50	Conditional	No	Required when processing the Procedure Code
OBR-47.1.1	Subspecialty Code	256	Optional	No	Will auto-create new values via HL7
OBR-47.2.1	Subspecialty Description	255	Optional	No	
OBR-47.3.1	Subspecialty Assigning Authority	50	Conditional	No	Required when processing Subspecialty Code

6.5.10 OBR Segment (for OMI Messages)

HL7 Element	HL7 Element Name	Character Limit	Optionality	Repeatable	Notes
OBR-1.1.1	Set ID		Optional	No	
OBR-4.1.1	Universal Service Identifier Code	45	Required	No	
OBR-4.2.1	Universal Service Identifier Description	128	Required	No	
OBR-4.3.1	Universal Service Identifier Assigning Authority	50	Required	No	
OBR-5.1.1	Clinical Priority Code	20	Required	No	Will auto-create new values via HL7 Code Table: Priority Code
OBR-6.1.1	Exam Begun Date/Time	datetime	Optional	No	Date/time that the exam was started. Will only be processed on "In Progress" status messages.
OBR-13.1.1	Relevant Clinical Information	999	Optional	No	
OBR-15.4.1	Body Part Code	20	Optional	No	Will auto-create new values via HL7
OBR-16.1.1	Ordering Provider ID	45	Optional	No	
OBR-16.2.1	Ordering Provider Last Name	50	Conditional	No	Required when processing the Ordering Provider ID
OBR-16.3.1	Ordering Provider First Name	50	Optional	No	
OBR-16.4.1	Ordering Provider Middle Name	50	Optional	No	
OBR-16.5.1	Ordering Provider Name Suffix	50	Optional	No	
OBR-16.6.1	Ordering Provider Name Prefix	50	Optional	No	
OBR-16.9.1	Ordering Provider Assigning Authority	50	Conditional	No	Required when processing the Ordering Provider ID

OBR-22.1.1	Result Date/Time	datetime	Optional	No	
OBR-25.1.1	Result Status Code	3	Optional	No	
OBR-31.1.1	Reason For Study	255	Optional	No	
OBR-32.1.1	Principal Result Interpreter ID	45	Optional	No	
OBR-32.1.2	Principal Result Interpreter Last Name	50	Conditional	No	Required when processing the Principal Result Interpreter ID
OBR-32.1.3	Principal Result Interpreter First Name	50	Optional	No	
OBR-32.1.4	Principal Result Interpreter Middle Name	50	Optional	No	
OBR-32.1.5	Principal Result Interpreter Name Suffix	50	Optional	No	
OBR-32.1.6	Principal Result Interpreter Name Prefix	50	Optional	No	
OBR-32.1.9	Principal Result Interpreter Assigning Authority	50	Conditional	No	Required when processing the Principal Result Interpreter ID
OBR-33.1.1	Assistant Result Interpreter ID	45	Optional	No	
OBR-33.1.2	Assistant Result Interpreter Last Name	50	Conditional	No	Required when processing the Assistant Result Interpreter ID
OBR-33.1.3	Assistant Result Interpreter First Name	50	Optional	No	
OBR-33.1.4	Assistant Result Interpreter Middle Name	50	Optional	No	
OBR-33.1.5	Assistant Result Interpreter Name Suffix	50	Optional	No	
OBR-33.1.6	Assistant Result	50	Optional	No	

	Interpreter Name Prefix				
OBR-33.1.9	Assistant Result Interpreter Assigning Authority	50	Conditional	No	Required when processing the Assistant Result Interpreter ID
OBR-34.1.1	Performing Technician ID	45	Optional	No	
OBR-34.1.2	Performing Technician Last Name	50	Conditional	No	Required when processing the Performing Technician ID
OBR-34.1.3	Performing Technician First Name	50	Optional	No	
OBR-34.1.4	Performing Technician Middle Name	50	Optional	No	
OBR-34.1.5	Performing Technician Name Suffix	50	Optional	No	
OBR-34.1.6	Performing Technician Name Prefix	50	Optional	No	
OBR-34.1.9	Performing Technician Assigning Authority	50	Conditional	No	Required when processing the Performing Technician ID
OBR-36.1.1	Procedure Step Start Date/Time	datetime	Required	No	If empty, will try to pull from OBR-27.4.1, followed by OBR-27.1.1
OBR-44.1.1	Procedure Code	45	Optional	No	
OBR-44.2.1	Procedure Description	128	Optional	No	
OBR-44.3.1	Procedure Assigning Authority	50	Conditional	No	Required when processing the Procedure Code
OBR-47.1.1	Subspecialty Code	256	Optional	No	Will auto-create new values via HL7
OBR-47.2.1	Subspecialty Description	255	Optional	No	
OBR-47.3.1	Subspecialty Assigning Authority	50	Conditional	No	Required when processing Subspecialty Code

6.5.11 IPC Segment

HL7 Element	HL7 Element Name	Character Limit	Optionality	Repeatable	Notes
IPC-1.1.1	Accession Number	64	Required	No	If this field is blank, will attempt to pull from ORC-3.1.1, followed by OBR-3.1.1
IPC-2.1.1	Requested Procedure ID	16	Required	No	This must be consistent across all messaging from all systems to avoid errors
IPC-3.1.1	Study Instance UID	255	Required	No	
IPC-4.1.1	Scheduled Procedure Step ID	16	Required	No	This must be consistent across all messaging from all systems to avoid errors
IPC-5.1.1	Modality Code	4	Optional	No	
IPC-9.1.1	Scheduled Station AE Title	255	Optional	No	

6.5.12 CTD Segment

HL7 Element	HL7 Element Name	Character Limit	Optionality	Repeatable	Notes
CTD-4.4.1	Performing Location Name	255	Optional	No	
CTD-4.10.1	Performing Location ID	50	Optional	No	
CTD-4.10.2	Performing Location Assigning Authority	50	Conditional	No	Required when processing the Performing Location ID

6.5.13 NTE Segment

HL7 Element	HL7 Element Name	Character Limit	Optionality	Repeatable	Notes
NTE-1.1.1	Set ID		Optional	No	
NTE-2.1.1	Note Type	255	Optional	No	The following values are supported: "ORDER COMMENT", "MEDICAL CHECK TECH NOTES"
NTE-3.1.1	Note Value	max	Optional	No	

6.5.14 TXA Segment

HL7 Element	HL7 Element Name	Character Limit	Optionality	Repeatable	Notes
TXA-1.1.1	Set ID		Required	No	This HL7 field should specify the value 1. Note that Syngo Carbon Workflow cannot process more than one HL7 TXA segment.
TXA-2.1.1	Medical Document Type ID	64	Required	No	
TXA-2.2.1	Medical Document Type Description	64	Optional	No	
TXA-2.3.1	Medical Document Type Coding System ID	64	Optional	No	
TXA-2.4.1	Medical Document Class Code ID	64	Optional	No	
TXA-2.5.1	Medical Document Class Code Description	100	Optional	No	
TXA-2.6.1	Medical Document Class Code Coding System ID	64	Optional	No	
TXA-3.1.1	Medical Document Content Presentation	256	Required	No	
TXA-6.1.1	Medical Document Creation Timestamp	24	Optional	No	
TXA-9.1.1	Medical Document Originator	24	Optional	No	
TXA-12.1.1	Medical Document ID	256	Required	No	This field has to specify the ID of the referenced medical document which is used together with the application ID specified by the HL7 component MSH-3.1 or MSH-3.2 to uniquely identify the generic file
TXA-13.1.1	Prior Medical Document ID	256	Optional	No	If the medical document ID is changed, the HL7 component TXA-13.1 must specify the old generic file ID to guarantee that updates can be performed correctly.
TXA-16.1.1	Medical Documentname	256	Required	No	This HL7 field provides the name of the medical document, including its file extension. The specification of TXA-16 is mandatory if the medical document is to be inserted or updated by a new version which possesses a different file extension.
TXA-17.1.1	Medical Document Completion Status	50	Optional	No	

TXA-18.1.1	Medical Document Confidentiality Status	256	Optional	No	
TXA-22.1.1	Medical Document Authenticator	1000	Optional	No	
TXA-24.1.1	Generic Container ID	256	Required	No	
TXA-24.2.1	Generic Container Description	250	Optional	No	
TXA-24.3.1	Generic Container Coding System ID	64	Required	No	
TXA-25.1.1	Medical Document Description	250	Optional	No	This field is mandatory if the medical document is to be registered in an Affinity Domain.

6.5.15 OBX Segment (For MDM messages)

HL7 Element	HL7 Element Name	Character Limit	Optionality	Repeatable	Notes
OBX-1.1.1	Set ID		Optional	No	
OBX-2.1.1	Value Type		Required	No	ED: Indicates that the binary data of the generic file addressed by the HL7 OBX segment is encapsulated in the HL7 MDM message. RP: Indicates that the binary data of the medical document is referenced using a UNC path
OBX-4.1.1	Sub-ID		Optional	No	

Syngo Carbon Workflow interprets the value of the HL7 MDM field OBX-5 by using the value type information specified by OBX-2. The structure of OBX-5 varies depending on the value type:

Binary Data (Value Type ED)

If the value type defined in OBX-2 is "ED", the HL7 field OBX-5 must contain the following information:

OBX-5.2.1	Mime Type		Required	No	
OBX-5.3.1	Mime Subtype		Optional	No	
OBX-5.4.1	Encoding		Required	No	
OBX-5.5.1	Binary Data		Required	No	

UNC Path (value type RP)

If the value type defined in OBX-2 is "RP", OBX-5 must contain the following information:

OBX-5.1.1	UNC Path		Required	No	
OBX-5.3.1	Mime Type		Required	No	
OBX-5.4.1	Mime Subtype		Optional	No	

OBX-8.1.1	Content Type Code ID	1000	Optional	No	This HL7 field defines an interpretation code. If the medical document is to be registered in an Affinity Domain, Syngo Carbon Workflow requires the specified interpretation code to define the content type code of the medical document (see IHE IT Infrastructure Technical Framework for further information)
OBX-8.2.1	Content Type Code Display Name		Optional	No	
OBX-8.3.1	Content Type Code Coding Scheme		Optional	No	
OBX-11.1.1	Medical Document Result Status	50	Optional	No	This HL7 field should specify the value F, R or X. The visibility restriction type of the medical document is set as follows: • F is mapped to None, • R is mapped to Restricted, • X is mapped to Private. Specifying F is recommended. Code Table: Result Status Code
OBX-14.1.1	Medical Document Creation Timestamp		Optional	No	This HL7 field should specify the same value as the HL7 field TXA-6

6.5.16 OBX Segment - Lab and Observation Results (ORU messages)

HL7 Element	HL7 Element Name	Character Limit	Optionality	Repeatable	Notes
OBX-1.1.1	Set ID		Optional	No	
OBX-2.1.1	Value Type		Optional	No	
OBX-2.2.1	Result Type		Required	No	Either "LAB" or "OBS"
OBX-3.1.1	Observation ID	45	Required	No	
OBX-3.2.1	Observation Description	255	Optional	No	
OBX-3.3.1	Observation Assigning Authority	45	Required	No	
OBX-5.1.1	Observation Result Value	255	Required	No	
OBX-6.1.1	Units	255	Optional	No	
OBX-7.1.1	Reference Range	20	Optional	No	
OBX-8.1.1	Abnormal Flag	3	Optional	No	
OBX-11.1.1	Observation Result Status	3	Required	No	Limitation: records will not be deleted when sending "D". This will be addressed in a future release. Code Table: Result Status Code
OBX-14.1.1	Observation Date/Time	datetime	Required	No	

6.5.17 ZDS Segment

This segment is used to communicate the study instance UID.

HL7 Element	HL7 Element Name	Character Limit	Optionality	Repeatable	Notes
ZDS-1.1.1	Study Instance UID	255	Optional	No	If no ZDS segment is sent in ORM messages, Syngo Carbon Workflow will generate one.

6.5.18 ZMC Segment

This segment is used to communicate Medical Check information.

HL7 Element	HL7 Element Name	Character Limit	Optionality	Repeatable	Notes
ZMC-1.1.1	Medical Check Status Code	4	Conditional	No	Code Table: Medical Check Status Code Required when populating medical check data
ZMC-2.1.1	Checked Date/Time	datetime	Optional	No	
ZMC-3.1.1	Checking Physician Id	520	Optional	No	
ZMC-3.2.1	Checking Physician Family Name	256	Optional	No	
ZMC-3.3.1	Checking Physician Given Name	256	Optional	No	
ZMC-4.1.1	Medical Check Comments	max	Optional	No	

6.5.19 ZKV Segment

This segment is used to communicate Medical Check Q&A.

HL7 Element	HL7 Element Name	Character Limit	Optionality	Repeatable	Notes
ZKV-1.1.1	Medical Check Question	255	Optional	No	
ZKV-2.1.1	Medical Check Answer	255	Optional	No	

7 HL7 Outbound Interface

7.1 Order Updates (ORM)

7.1.1 ORM Trigger Events

To send order updates via HL7 ORM messages, Syngo Carbon Workflow only supports the **O01** trigger event. This message type is used by default for sending order updates. The ORM^O01 will conform to the following structure:

- MSH PID PV1 ORC OBR ZDS {[ZKV]} [ZMC] {[NTE]}

7.2 Order Updates (OMI)

7.2.1 OMI Trigger Events

To send order updates via HL7 OMI messages, Syngo Carbon Workflow only supports the **O23** trigger event. This message type will not be delivered by default and needs to be enabled if required (can be done by Siemens implementation team). The OMI^O23 will conform to the following structure:

- MSH PID PV1 ORC OBR IPC {[ZKV]} [ZMC] {[NTE]}

7.3 Image Availability Notifications (ORU)

7.3.1 ORU Trigger Events

To send Image Availability Notifications via HL7 ORU messages, Syngo Carbon Workflow only supports the **R01** trigger event. The ORU^R01 will conform to the following structure:

- MSH PID [PV1] {[ORC] OBR} OBX

7.4 Unsolicited Observation Message (ORU)

7.4.1 ORU Trigger Events

To send unsolicited observations via HL7 ORU messages, Syngo Carbon Workflow only supports the **R01** trigger event. The ORU^R01 message is sent out containing the published / signed report in plain text format encoded in the OBX segment. The ORU^R01 will conform to the following structure:

- MSH PID [PV1] ORC OBR {OBX}

7.5 Original Document Notification and Content (MDM)

7.5.1 MDM Trigger Events

To send original document notification and content via HL7 MDM messages, Syngo Carbon Workflow only supports the **T02** trigger event. The MDM^T02 message is sent out containing the published/signed report in PDF format encoded in the OBX segment. The MDM^T02 will conform to the following structure:

- MSH PID [PV1] {ORC OBR} TXA {OBX}

7.6 HL7 Segments Outbound

This section lists the segments that are sent out by Syngo Carbon Workflow.

7.6.1 MSH Segment

HL7 Element	HL7 Element Name	Repeatable	Notes
MSH-1	Field Separator	No	
MSH-2	Encoding Characters	No	
MSH-3.1.1	Sending Application	No	Configurable. Will be set to "INTELLIGO" by default
MSH-4.1.1	Sending Facility	No	Will be set to the Requested Procedure Organization ID
MSH-5.1.1	Receiving Application	No	Will default to "RIS-HL7"
MSH-6.1.1	Receiving Facility	No	Will default to "RIS"
MSH-7.1.1	Date/Time of Message	No	
MSH-9.1.1	Message Type	No	
MSH-9.2.1	Trigger Event	No	
MSH-10.1.1	Message Control ID	No	
MSH-11.1.1	Processing ID	No	Will be set to "P"
MSH-12.1.1	HL7 Version ID	No	Will be set to "2.5"

7.6.2 PID Segment

HL7 Element	HL7 Element Name	Repeatable	Notes
PID-3.1.1	Patient ID	Yes	
PID-3.4.1	Patient ID Assigning Authority		
PID-3.4.2	Patient ID Universal ID		e.g. "999.999.999"
PID-3.4.3	Patient ID Universal ID Type		e.g. "ISO"
PID-3.5.1	Patient ID Type		
PID-5.1.1	Patient Last Name	Yes	
PID-5.2.1	Patient First Name		

PID-5.3.1	Patient Middle Name		
PID-5.4.1	Patient Name Suffix		
PID-5.5.1	Patient Name Prefix		
PID-5.7.1	Patient Name Type Code		Will either be empty or "L" for "Legal Name"
PID-5.8.1	Patient Name Representation Code		A: Alphabetic I: Ideographic P: Phonetic
PID-7.1.1	Patient Date/Time of Birth	No	Will trim to just the YYYYMMDD
PID-8.1.1	Patient Gender Code	No	

7.6.3 PV1 Segment

HL7 Element	HL7 Element Name	Repeatable	Notes
PV1-2.1.1	Patient Class Code	No	
PV1-3.1.1	Patient Location Point of Care	No	
PV1-3.4.1	Patient Location Name	No	
PV1-3.10.1	Patient Location ID	No	
PV1-3.10.2	Patient Location ID Assigning Authority	No	
PV1-8.1.1	Referring Provider ID	No	
PV1-8.2.1	Referring Provider Last Name	No	
PV1-8.3.1	Referring Provider First Name	No	
PV1-8.4.1	Referring Provider Middle Name	No	
PV1-8.5.1	Referring Provider Name Suffix	No	
PV1-8.6.1	Referring Provider Name Prefix	No	
PV1-8.9.1	Referring Provider Assigning Authority	No	
PV1-15.1.1	Ambulatory Status Code	No	Currently, the only accepted value is "B9", to indicate the patient is pregnant
PV1-17.1.1	Admitting Provider ID	No	
PV1-17.2.1	Admitting Provider Last Name	No	
PV1-17.3.1	Admitting Provider First Name	No	

PV1-17.4.1	Admitting Provider Middle Name	No	
PV1-17.5.1	Admitting Provider Name Suffix	No	
PV1-17.6.1	Admitting Provider Name Prefix	No	
PV1-17.9.1	Admitting Provider Assigning Authority	No	
PV1-19.1.1	Visit ID	No	
PV1-19.4.1	Visit Assigning Authority	No	

7.6.4 AL1 Segment

HL7 Element	HL7 Element Name	Repeatable	Notes
AL1-2.1.1	Allergen Type Code	No	
AL1-2.2.1	Allergen Type Description	No	
AL1-3.2.1	Allergen Description	No	
AL1-4.1.1	Allergy Severity Code	No	
AL1-4.2.1	Allergy Severity Description	No	
AL1-5.1.1	Allergy Reaction Code	Yes	
AL1-6.1.1	Identification Date/Time	No	
AL1-10.1.1	Allergy Source System ID	No	

7.6.5 DG1 Segment

HL7 Element	HL7 Element Name	Repeatable	Notes
DG1-3.1.1	Diagnosis Identifier	No	
DG1-3.2.1	Diagnosis Description	No	
DG1-3.3.1	Diagnosis Type	No	The following values are supported: "RF" – Risk Factor "Hx" – Medical Alerts "Sx" – Signs and Symptoms "Dx" – Diagnosis

7.6.6 ORC Segment

HL7 Element	HL7 Element Name	Repeatable	Notes
ORC-1.1.1	Order Control Code	No	
ORC-2.1.1	Placer Order Id	No	
ORC-2.2.1	Placer Order Assigning Authority	No	
ORC-3.1.1	Filler Order Id	No	
ORC-3.2.1	Filler Order Assigning Authority	No	
ORC-3.3.1	Filler Order Universal ID	No	e.g. "999.999.999"
ORC-3.4.1	Filler Order Universal ID Type	No	e.g. "ISO"
ORC-5.1.1	Order Status	No	Code Table: Order Status Code
ORC-13.1.1	Ordering Location Point of Care	No	
ORC-13.4.1	Ordering Location Name	No	
ORC-25.1.1	Reporting Workflow Status Code	No	Code Table: Reporting Workflow Status Code
ORC-27.1.1	Placer Order Scheduled Date/Time	No	

7.6.7 OBR Segment (for ORM^O01 Messages)

HL7 Element	HL7 Element Name	Repeatable	Notes
OBR-1.1.1	Set ID	No	
OBR-4.1.1	Universal Service Identifier Code	No	
OBR-4.2.1	Universal Service Identifier Description	No	
OBR-4.3.1	Universal Service Identifier Assigning Authority	No	
OBR-5.1.1	Clinical Priority Code	No	Code Table: Priority Code
OBR-13.1.1	Relevant Clinical Information	No	
OBR-16.1.1	Ordering Provider ID	No	
OBR-16.2.1	Ordering Provider Last Name	No	
OBR-16.3.1	Ordering Provider First Name	No	
OBR-16.4.1	Ordering Provider Middle Name	No	
OBR-16.5.1	Ordering Provider Name Suffix	No	
OBR-16.6.1	Ordering Provider Name Prefix	No	
OBR-16.9.1	Ordering Provider Assigning Authority	No	
OBR-18.1.1	Accession Number	No	
OBR-19.1.1	Requested Procedure ID	No	
OBR-20.1.1	Scheduled Procedure Step ID	No	
OBR-21.1.1	Scheduled Station AE Title	No	
OBR-31.1.1	Reason For Study	No	
OBR-34.1.1	Performing Technician ID	No	
OBR-34.1.2	Performing Technician Last Name	No	
OBR-34.1.3	Performing Technician First Name	No	
OBR-34.1.4	Performing Technician Middle Name	No	
OBR-34.1.5	Performing Technician Name Suffix	No	

OBR-34.1.6	Performing Technician Name Prefix	No	
OBR-34.1.9	Performing Technician Assigning Authority	No	
OBR-36.1.1	Procedure Step Start Date/Time	No	
OBR-44.1.1	Procedure Code	No	
OBR-44.2.1	Procedure Description	No	
OBR-44.3.1	Procedure Assigning Authority	No	

7.6.8 OBR Segment (for OMI^O23 Messages)

HL7 Element	HL7 Element Name	Repeatable	Notes
OBR-1.1.1	Set ID	No	
OBR-4.1.1	Universal Service Identifier Code	No	
OBR-4.2.1	Universal Service Identifier Description	No	
OBR-4.3.1	Universal Service Identifier Assigning Authority	No	
OBR-5.1.1	Clinical Priority Code	No	Code Table: Priority Code
OBR-13.1.1	Relevant Clinical Information	No	
OBR-16.1.1	Ordering Provider ID	No	
OBR-16.2.1	Ordering Provider Last Name	No	
OBR-16.3.1	Ordering Provider First Name	No	
OBR-16.4.1	Ordering Provider Middle Name	No	
OBR-16.5.1	Ordering Provider Name Suffix	No	
OBR-16.6.1	Ordering Provider Name Prefix	No	
OBR-16.9.1	Ordering Provider Assigning Authority	No	
OBR-31.1.1	Reason For Study	No	
OBR-34.1.1	Performing Technician ID	No	
OBR-34.1.2	Performing Technician Last Name	No	

OBR-34.1.3	Performing Technician First Name	No	
OBR-34.1.4	Performing Technician Middle Name	No	
OBR-34.1.5	Performing Technician Name Suffix	No	
OBR-34.1.6	Performing Technician Name Prefix	No	
OBR-34.1.9	Performing Technician Assigning Authority	No	
OBR-36.1.1	Procedure Step Start Date/Time	No	
OBR-44.1.1	Procedure Code	No	
OBR-44.2.1	Procedure Description	No	
OBR-44.3.1	Procedure Assigning Authority	No	

7.6.9 OBR Segment (For ORU^R01 - Observation Results)

HL7 Element	HL7 Element Name	Repeatable	Notes
OBR-1.1.1	Set ID	No	
OBR-4.1.1	Universal Service Identifier Code	No	
OBR-4.2.1	Universal Service Identifier Description	No	
OBR-4.3.1	Universal Service Identifier Assigning Authority	No	
OBR-25.1.1	Result Status Code	No	The status of the distributed report. P - preliminary report or finalized report with a preliminary addendum F - finalized report C - finalized report with a finalized addendum
OBR-31.1.1	Reason For Study	No	

OBR-32.1.1	Principal Result Interpreter User ID	No	UserID@Domain Example: jsmith1@LOCAL
OBR-32.1.2	Principal Result Interpreter User Name	No	Example: John Smith
OBR-33.1.1	Assistant Result Interpreter User ID	No	UserID@Domain Example: jdoe567@LOCAL
OBR-33.1.2	Assistant Result Interpreter User Name	No	Example: Jane Doe

7.6.10 OBR Segment (For ORU^R01 – Image Availability Notification)

HL7 Element	HL7 Element Name	Repeatable	Notes
OBR-1.1.1	Set ID	No	
OBR-2.1.1	Placer Order Id	No	
OBR-2.2.1	Placer Order Assigning Authority	No	
OBR-2.3.1	Placer Order Universal ID	No	e.g. "999.999.999"
OBR-2.4.1	Placer Order Universal ID Type	No	e.g. "ISO"
OBR-3.1.1	Filler Order Id	No	
OBR-3.2.1	Filler Order Assigning Authority	No	
OBR-3.3.1	Filler Order Universal ID	No	e.g. "999.999.999"
OBR-3.4.1	Filler Order Universal ID Type	No	e.g. "ISO"
OBR-4.1.1	Universal Service Identifier Code	No	
OBR-4.2.1	Universal Service Identifier Description	No	
OBR-7.1.1	Study Completed Date/Time	No	
OBR-18.1.1	Accession Number	No	
OBR-19.1.1	Requested Procedure ID	No	
OBR-22.1.1	Observation Insertion Timestamp	No	
OBR-25.1.1	Result Status Code	No	D: This value is specified if the object has been deleted.

			F: This value is specified for all other statuses.
OBR-31.1.1	Reason For Study	No	
OBR-47.1.1	Filler Supplemental Service Information	Yes	Gives the corresponding DICOM tag keyword ManufacturerModelName as an identifier.
OBR-47.2.1	Filler Supplemental Service Information		Gives the actual name of the manufacturer model.

7.6.11 NTE Segment

HL7 Element	HL7 Element Name	Repeatable	Notes
NTE-1.1.1	Set ID	No	
NTE-2.1.1	Note Type	No	The following values are sent: "ORDER COMMENT", "MEDICAL CHECK TECH NOTES"
NTE-3.1.1	Note Value	No	

7.6.12 OBX Segment (For ORU^R01 - Observation Results)

The message includes one or two OBX segments. The first mandatory segment provides the report content in text form:

HL7 Element	HL7 Element Name	Repeatable	Notes
OBX-1.1.1	Set ID	No	
OBX-2.1.1	Value Type	No	Always "TX"
OBX-5.1.1	Observation Value	No	The actual content of the report is sent in this field. The content is the generated plain text of the report, HL7 escaped. Example: Requested procedure information\X0A\Description: CT Thorax\X0A\ACC#: SR_154889422
OBX-11.1.1	Observation Result Status	No	The status of the distributed report. P - preliminary report or finalized report with a preliminary addendum F - finalized report C - finalized report with a finalized addendum/revision

A second OBX segment with the Imaging Study Instance UID will be included when available:

HL7 Element	HL7 Element Name	Repeatable	Notes
OBX-1.1.1	Set ID	No	
OBX-2.1.1	Value Type	No	Always "ST"
OBX-5.1.1	Observation Value	No	The study instance UID of the submitted Imaging Study Example: 1.3.12.2.1107.5.8.3.807665

7.6.13 OBX Segment - Lab and Observation Results

HL7 Element	HL7 Element Name	Repeatable	Notes
OBX-1.1.1	Set ID	No	
OBX-2.1.1	Value Type	No	
OBX-2.2.1	Result Type	No	Either "LAB" or "OBS"
OBX-3.1.1	Observation ID	No	
OBX-3.2.1	Observation Description	No	
OBX-3.3.1	Observation Assigning Authority	No	
OBX-5.1.1	Observation Result Value	No	
OBX-6.1.1	Units	No	
OBX-7.1.1	Reference Range	No	
OBX-8.1.1	Abnormal Flag	No	
OBX-11.1.1	Observation Result Status	No	
OBX-14.1.1	Observation Date/Time	No	

7.6.14 OBX Segment (For MDM^T02 - Original Document Notification and Content)

The MDM^T02 message is sent out containing the published / signed report in PDF format encoded in the OBX segment.

The message includes one or two OBX segments. The first mandatory segment provides the report content:

HL7 Element	HL7 Element Name	Repeatable	Notes
OBX-1.1.1	Set ID	No	
OBX-2.1.1	Value Type	No	Always "ED"
OBX-5.1.1	Observation Value	No	The actual content of the report is sent in this field. It contains the following structure: <pre>^application^pdf^Base64^<base64></pre> Where <base64> is the PDF encoded as MIME.
OBX-11.1.1	Observation Result Status	No	The status of the distributed report. P - preliminary report or finalized report with a preliminary addendum

			F - finalized report C - finalized report with a finalized addendum/revision In case the message is sent for creation, deletion or status change, this field will contain the following values (also applies for addendum/revision): R - for PENDING (on creation) or DRAFT status P - for PRELIM status D - when the report is deleted
--	--	--	---

A second OBX segment with the Imaging Study Instance UID will be included when available:

HL7 Element	HL7 Element Name	Repeatable	Notes
OBX-1.1.1	Set ID	No	
OBX-2.1.1	Value Type	No	Always "ST"
OBX-5.1.1	Observation Value	No	The study instance UID of the submitted Imaging Study Example: 1.3.12.2.1107.5.8.3.807665

7.6.15 OBX Segment (For ORU^R01 – Image Availability Notification)

HL7 Element	HL7 Element Name	Repeatable	Notes
OBX-1.1.1	Set ID	No	
OBX-2.1.1	Value Type	No	Always "RP" for "Reference Pointer". This can be used to identify the ORU as an IAN
OBX-3.1.1	Document Instance UID	No	If the document represents a DICOM study, the UID is identical to the Study Instance UID
OBX-3.2.1	Document Description	No	
OBX-3.4.1	Document ID	No	This HL7 component specifies an alternate ID of the referenced document
OBX-4.1.1	HL7 OBX Segment Sub-ID	No	
OBX-5.1.1	Reference Pointer	No	
OBX-5.5.1	Document Instance Number	No	This HL7 component defines the number of DICOM images in a DICOM study
OBX-8.1.1	Document Composition	No	Lists the modalities of the DICOM series
OBX-11.1.1	Observation Result Status	No	This HL7 field is used to differentiate between HL7 ORU messages which insert or update medical documents and HL7 ORU messages which delete medical documents: F: This value must be specified in order to insert or update a medical document. D: This value must be specified in order to delete a medical document

7.6.16 TXA Segment

HL7 Element	HL7 Element Name	Repeatable	Notes
TXA-1.1.1	Set ID	No	Static value "1"
TXA-2.1.1	Document Type	No	Always "DR"
TXA-3.1.1	Document Content Presentation	No	Always "AP"
TXA-12.1.1	Unique Document Number	No	contains the report ID used to create the report
TXA-14.1.1	Placer Order Number	No	

TXA-14.2.1	Placer Order Assigning Authority	No	
TXA-15.1.1	Accession Number	No	
TXA-15.2.1	Accession Number Issuer ID	No	
TXA-15.3.1	Accession Number Universal ID	No	
TXA-15.4.1	Accession Number Universal ID Type	No	
TXA-16.1.1	Unique Document File Name	No	Always "Diagnostic Imaging Report"
TXA-17.1.1	Document Completion Status	No	IP - preliminary report without addendum AU - finalized report or preliminary addendum

7.6.17 ZDS Segment

This segment is used to communicate the study instance UID.

HL7 Element	HL7 Element Name	Repeatable	Notes
ZDS-1.1.1	Study Instance UID	No	

7.6.18 ZMC Segment

This segment is used to communicate Medical Check information.

HL7 Element	HL7 Element Name	Repeatable	Notes
ZMC-1.1.1	Medical Check Status Code	No	Code Table: Medical Check Status Code
ZMC-2.1.1	Checked Date/Time	No	
ZMC-3.1.1	Checking Physician Id	No	
ZMC-3.2.1	Checking Physician Family Name	No	
ZMC-3.3.1	Checking Physician Given Name	No	
ZMC-4.1.1	Medical Check Comments	No	

7.6.19 ZKV Segment

This segment is used to communicate Medical Check Q&A.

HL7 Element	HL7 Element Name	Repeatable	Notes
ZKV-1.1.1	Medical Check Question	No	
ZKV-2.1.1	Medical Check Answer	No	

8 Code Tables

8.1 Medical Check Status Code

Code	Description
A	Approved
N	New
NR	Not Required
P	Pending
R	Rejected

8.2 Reporting Workflow Status Code

Code	Description
PG	Pending
N	New
A	Draft
DA	Draft Addendum
P	Prelim
PA	Prelim Addendum
PAP	Pending Approval
S	Finalized
PAD	Pending Addendum
APAP	Addendum Pending Approval
C	Finalized Addendum
R	Rejected
AR	Addendum Rejected
PRE	Pending Revision
DR	Draft Revision
PR	Prelim Revision

CR	Finalized Revision
RPAP	Revision Pending Approval
RR	Revision Rejected

8.3 Priority Code

Code	Description
S	Stat
H	High
R	Routine
M	Medium
L	Low

8.4 Order Status Code

Code	Description
C	Completed
I	In progress
S	Scheduled
X	Cancelled
N	Non-reportable

8.5 Result Status Code

Code	Description
A	Addended
D	Dictated
F	Final
P	Preliminary
T	Transcribed

9 HL7 Examples

Disclaimer: This section provides the segments and format used for the defined message types. It does not mean that these messages will process out of the box, as some application configuration may need to be done (e.g. creating new assigning authorities). Additionally, the values within are fabricated and do not represent real world values or names.

9.1 Sample HL7 Messages – Inbound

ADT^A08 (same for A01, A02, A06, A07):

```
MSH|^~\&|RIS|RADIOLOGY|INTELLIGO|HL7_DEMO|20211019092000||ADT^A08|001|P|2.5|
PID|||mrn1^^^Default
Authority&999.999.999&ISO^PI~S123^^^Siemens&999.999.999&ISO^PI~12345678^^^SSA&999.999.999&ISO^
SS||Yamada^Tarou^J^Jr.^Mr.^P^A~山田^太郎^^^^^P^A|~やまだ^たろう^^^^^P^A|||M|
PV1||E|ER1^^^Emergency Department^^^^^^ED&Default
Authority^|||||REF34604^Guy^Provider^^MD^Physician^^^Default Authority^^^^^^A|||||
||ADM4604^Guy^Provider^^MD^Physician^^^Default Authority^^^^^^A||434-49-1605^^^Default
Authority|MED|
AL1|1|FA^Food Allergy|^peanuts|SV^Severe|R~H|202011221530||||Default Authority
IN1|||||||||||Medicare|
```

ADT^A40 (similar message for A34 and A18):

```
MSH|^~\&|RIS|RADIOLOGY|INTELLIGO|HL7_DEMO|20211019092000||ADT^A40|001|P|2.5|
PID|||mrn1^^^Default Authority&999.999.999&ISO^PI||Smith^John^J^Jr.^Mr.^P^A||19200819|M|
MRG|P123457^^^Default Authority&999.999.999&ISO|
```

ADT^A31:

```
MSH|^~\&|RIS|RADIOLOGY|INTELLIGO|HL7_DEMO|20211019092000||ADT^A31|001|P|2.5|
PID|||mrn1^^^Default Authority&999.999.999&ISO^PI~S123^^^Siemens&999.999.999&ISO
^PI~EMPI789^^^EMPI&999.999.999&ISO^GPI||Smith^John^J^Jr.^Mr.^P^A||19200819|M|
```

ORM^O01 (single procedure):

MSH|^~\&|INTELLIGO|RADIOLOGY|INTELLIGO|HL7_DEMO|20240620151349||ORM^O01|65014|P|2.5|||||UNICODE
UTF-8
PID|||MRN_1^^^Default Authority&999.999.999&ISO^PI||Patient^Test^middle^^Mrs^^^A||19690715|F
PV1||O|44723^^^Seaburn - Patient|||||REF1^Referring^Provider^ref^^Miss^^^Default
Authority|||||ADM1^Admitting^Provider^adm^^Mrs.^^^Default Authority||VIS_1^^^Default Authority|MED
AL1|1|FA^Food Allergy|^peanuts|SV^Severe|R~H|202011221530||||Default Authority
IN1|||||Medicare|||||
ORC|XO|PO_1^Default Authority|FO_1^Default
Authority^999.999.999^ISO|SC|||202503191530||||Office1^^^Seaburn -
Ordering^^^^^^12345&RADIOLOGY|||||PG||202503221230
OBR|1||CT HEAD^CT HEAD^Default Authority|S|||||RCI||ORP1^Ordering^Provider^orp^^Mr.^^^Default
Authority||ACC_1|RP_1|PS_1|AE TITLE||CT|||||RFS||PTP&Performing&Tech&ptp&&&&Default
Authority||202503221230|||||CT HEAD^CT HEAD^Default Authority||MSK^MSK^Default Authority
ZKV|Claustrophobia|No
ZKV|Implants|No
ZKV|Pregnant|Yes
ZKV|Allergies|No
ZMC|N|20250319163000|physician123^Jane^Doe|Medical check required|
ZDS|1.3.12.2.1107.5.99.3.30000008073014125171700000131
NTE|1|ORDER COMMENT|orderCommentValue|
NTE|2|MEDICAL CHECK TECH NOTES|med check Tech Notes|
CTD||||^^^Grand River Hospital^^^^^^GRH&RADIOLOGY
DG1|||786.2^Cough^Sx
DG1|||abc123^Fever^Sx
DG1|||782.1^Rash^Sx
DG1|||079^Viral Infection^Dx
DG1|||123^Risk of fall^Rf
DG1|||002.0^TYPHOID FEVER^Hx
DG1|||CL^Claustrophobia^Rf
DG1|||xyz^hives^Hx

ORM^O01 (multiple procedures):

MSH|^~\&|INTELLIGO|RADIOLOGY|INTELLIGO|HL7_DEMO|20240620151349||ORM^O01|65014|P|2.5|||||UNICODE
UTF-8
PID|||MRN_1^^^Default Authority&999.999.999^ISO^PI||Patient^Test^middle^^Mrs^^^A||19690715|F
PV1||O|44723^^^Seaburn - Patient|||||REF1^Referring^Provider^ref^^Miss^^^Default
Authority|||||ADM1^Admitting^Provider^adm^^Mrs.^^^Default Authority||VIS_1^^^Default Authority|MED
AL1|1|FA^Food Allergy|^peanuts|SV^Severe|R~H|202011221530||||Default Authority
IN1|||||Medicare|||||
ORC|XO|PO_1^Default Authority|FO_1^Default
Authority^999.999.999^ISO|SC||||202503191530||||Office1^^^Seaburn -
Ordering^^^^^^12345&RADIOLOGY|||||PG||202503221230
OBR|1||CT 123abc^CT HEAD/NECK^Default Authority|S|||||RCI|||ORP1^Ordering^Provider^orp^^Mr.^^^Default
Authority||ACC_1|RP_1|PS_1|AE TITLE||CT|||||RFS|||PTP&Performing&Tech&ptp&^^^Default
Authority||202503221230|||||CT HEAD^CT HEAD^Default Authority|||MSK^MSK^Default Authority
ZKV|Claustrophobia|No
ZKV|Implants|No
ZKV|Pregnant|Yes
ZMC|N|20250319163000|physician123^Jane^Doe|Medical check required|
ZDS|1.3.12.2.1107.5.99.3.30000008073014125171700000131
NTE|1|ORDER COMMENT|orderCommentValue|
NTE|2|MEDICAL CHECK TECH NOTES|med check Tech Notes|
CTD|||^^^Grand River Hospital|^^^^^^GRH&RADIOLOGY
ORC|XO|PO_1^Default Authority|FO_1^Default
Authority^999.999.999^ISO|SC||||202503191530||||Office1^^^Seaburn -
Ordering^^^^^^12345&RADIOLOGY|||||PG||202503221245
OBR|1||CT 123abc^CT HEAD/NECK^Default Authority|S|||||RCI|||ORP1^Ordering^Provider^orp^^Mr.^^^Default
Authority||ACC_1|RP_2|PS_2|AE TITLE||CT|||||RFS|||PTP&Performing&Tech&ptp&^^^Default
Authority||202503221245|||||CT NECK^CT NECK^Default Authority|||MSK^MSK^Default Authority
ZMC|N|20250319163000|physician123^Jane^Doe|Medical check required|
ZDS|1.3.12.2.1107.5.99.3.30000008073014125171700000131
CTD|||^^^Grand River Hospital|^^^^^^GRH&RADIOLOGY

OMI^O23 (single procedure):

MSH|^~\&|INTELLIGO|RADIOLOGY|INTELLIGO|HL7_DEMO|202503191530||OMI^O23|65014|P|2.5|||||UNICODE
UTF-8
PID|||MRN_1^^^Default Authority&999.999.999&ISO^PI||Patient^Test^middle^^Mrs^^^A||19690715|F
PV1||O|44723^^^Seaburn - Patient||||REF1^Referring^Provider^ref^^Miss^^^Default
Authority|||||ADM1^Admitting^Provider^adm^^Mrs.^^^Default Authority||VIS_1^^^Default Authority|MED
AL1|1|FA^Food Allergy|^peanuts|SV^Severe|R~H|202011221530||||Default Authority
IN1|||||Medicare|||||
ORC|XO|PO_1^Default Authority|FO_1^Default
Authority^999.999.999^ISO|SC||||202503191530||||Office1^^^Seaburn -
Ordering^^^^^12345&RADIOLOGY|||||PG||202503221230
OBR|1||CT HEAD^CT HEAD^Default Authority|S|||||RCI||ORP1^Ordering^Provider^orp^^Mr.^^^Default
Authority|||||RFS||PTP&Performing&Tech&ptp&&&&Default Authority||202503221230|||||CT HEAD^CT
HEAD^Default Authority||MSK^MSK^Default Authority
ZKV|Claustrophobia|No
ZKV|Implants|No
ZKV|Pregnant|Yes
ZKV|Allergies|No
ZMC|N|20250319163000|physician123^Jane^Doe|Medical check required|
IPC|ACC_1|RP_1|1.3.12.2.1107.5.99.3.30000008073014125171700000131|PS_1|CT|||AE Title
NTE|1|ORDER COMMENT|orderCommentValue|
NTE|2|MEDICAL CHECK TECH NOTES|med check Tech Notes|
CTD|||^^^Grand River Hospital^^^^^GRH&RADIOLOGY
DG1|||786.2^Cough^Sx
DG1|||abc123^Fever^Sx
DG1|||782.1^Rash^Sx
DG1|||079^Viral Infection^Dx
DG1|||123^Risk of fall^Rf
DG1|||002.0^TYPHOID FEVER^Hx
DG1|||CL^Claustrophobia^Rf
DG1|||xyz^hives^Hx

MSH|^~&|INTELLIGO|RADIOLOGY|INTELLIGO|HL7_DEMO|202503191530||OMI^O23|65014|P|2.5|||||UNICODE
UTF-8
PID|||MRN_1^^^Default Authority&999.999.999&ISO^PI||Patient^Test^middle^^Mrs^^^A||19690715|F
PV1||O|44723^^^Seaburn - Patient||||REF1^Referring^Provider^ref^^Miss^^^Default
Authority||||||ADM1^Admitting^Provider^adm^^Mrs.^^^Default Authority||VIS_1^^^Default Authority|MED
AL1|1|FA^Food Allergy|^peanuts|SV^Severe|R~H|202011221530||||Default Authority
IN1|||||||Medicare|||||
ORC|XO|PO_1^Default Authority|FO_1^Default
Authority^999.999.999^ISO||SC||||202503191530||||Office1^^^Seaburn -
Ordering^^^^^12345&RADIOLOGY||||||PG||202503221230
OBR|1||CT_123abc^CT HEAD/NECK^Default Authority|S||||||RCI||ORP1^Ordering^Provider^orp^^Mr.^^^Default
Authority|||||||RFS|||PTP&Performing&Tech&ptp&&&&Default Authority||202503221230|||||CT HEAD^CT
HEAD^Default Authority||MSK^MSK^Default Authority
ZKV|Claustrophobia|No
ZKV|Implants|No
ZKV|Pregnant|Yes
ZKV|Allergies|No
ZMC|N|20250319163000|physician123^Jane^Doe|Medical check required|
IPC|ACC_1|RP_1|1.3.12.2.1107.5.99.3.30000008073014125171700000131|PS_1|CT||||AE Title
NTE|1|ORDER COMMENT|orderCommentValue|
NTE|2|MEDICAL CHECK TECH NOTES|med check Tech Notes|
CTD||||^^^Grand River Hospital^^^^^GRH&RADIOLOGY
ORC|XO|PO_1^Default Authority|FO_1^Default
Authority^999.999.999^ISO||SC||||202503191530||||Office1^^^Seaburn -
Ordering^^^^^12345&RADIOLOGY||||||PG||202503221245
OBR|1||CT_123abc^CT HEAD/NECK^Default Authority|S||||||RCI||ORP1^Ordering^Provider^orp^^Mr.^^^Default
Authority|||||||RFS|||PTP&Performing&Tech&ptp&&&&Default Authority||202503221245|||||CT NECK^CT
NECK^Default Authority||MSK^MSK^Default Authority
ZMC|N|20250319163000|physician123^Jane^Doe|Medical check required|
IPC|ACC_1|RP_2|1.3.12.2.1107.5.99.3.30000008073014125171700000132|PS_2|CT||||AE Title
CTD||||^^^Grand River Hospital^^^^^GRH&RADIOLOGY

M[SH~|&|SREPI|RADIOLOGY|INTELLIGO|MEDICALIS|20240628153827.0010||MDM^T02|11917|P|2.5|1||||ASCII
EVN||20240628153827.0010
PID|1||JBMRN_18^^^Default Authority&999.999.999&ISO^P||Duarte^Alvin^Candace^^^^^A||19690715|A
PV1||N|||||Angelica Donovan|||||JBVIS_18|||||V
ORC|RE|JBPO_18^Default Authority|JBACC_18^Default Authority^999.999.999^ISO
OBR||JBPO_18^Default Authority|JBACC_18^Default Authority^999.999.999^ISO|XIMSP2043^SP VENOGRAM
UPPER LOWER EXTREMITY RIGHT^Default Authority|||||C|||||^TestClinicalInfo|tkp@localdomain&tarun
kumar|tkp@localdomain||20240601
TXA|1|DR|AP|||||HKvcSxkgvYFm7C7Qz6jau6qdstff6ojc3EgdyoEci3g=||||Diagnostic Imaging
Report|AU|||||tkp@localdomain&tarun kumar||HKvcSxkgvYFm7C7Qz6jau6qdstff6ojc3EgdyoEci3g=^^99SR
OBX|1|ED|jobs^id^L||^application^pdf^Base64^JVBERi0xLQKMSAwlG9iago8PC9UeXBllC9DYXRhbG9nCi9QYWdlcy
AylDAgUgo+PgplbmRvYmoKMlAwlG9iago8PC9UeXBllC9QYWdlcwovS2lkcyBbMyAwlFjdCi9Db3VudCAxCj4+CmVuZ
G9iagozIDAgb2JqCjw8L1R5cGUgL1BhZ2UKL1BhcmVudCAylDAgUgovTWVkaWFCb3ggWzAgMCA1OTUgODQyXQov
Q29udGVudHMgNSAwlFIKL1Jlc291cmNlcyA8PC9Qcm9jU2V0lFsvUERGlC9UZxh0XQovRm9udCA8PC9GMSA0IDAg
Uj4+Cj4+Cj4+CmVuZG9iago0IDAgb2JqCjw8L1R5cGUgL0ZvbmlQKL1N1YnR5cGUgL1R5cGUxCi9OYW1lIC9GMQovQ
mFzZUZvbmlQKL0hblhZlDGljYQovRW5jb2RpbmcgL01hY1YvbWUuRW5jb2RpbmcKPl4KZW5kb2JqCjUgMCBvYmoKPD
wvTGvUz3RoIDUzCj4+CnN0cmVhbQpCVAovRjEgMjAgVGyKmljwIDQwMCBUZAooRHVtbXkgUERGKSBUagpFVAplbm
RzdHJlYW0KZW5kb2JqCnhyZWYKMCA2CjAwMDAwMDAwMDAgNjU1MzUgZGowMDAwMDAwMDA5IDAwMDAwlG
4KMDAwMDAwMDA2MyAwMDAwMCBUcCjAwMDAwMDAwMDAxMjQgMDAwMDAgbgowMDAwMDAwMjc3IDAwMDAwlG
4KMDAwMDAwMDAwMDM5MiAwMDAwMCBUcCnRyYWlsZXIKPDwvU2l6ZSA2Ci9Sb290IDEgMCBSCj4+CnN0YXJ0eHJlZgo0
OTUKJSVFT0YKl||||C

ORU^R01 (Labs and Observation Results):

MSH|^~\&|INTELLIGO|RADIOLOGY|INTELLIGO|HL7_DEMO|202503191530||ORU^R01|65014|P|2.5|||||UNICODE UTF-8
PID|||MRN_1^^^Default Authority&999.999.999&ISO^PI||Patient^Test^middle^^Mrs^^^A||19690715|F
PV1||O|44723^^^Seaburn - Patient||||REF1^Referring^Provider^ref^^Miss^^^Default Authority|||||ADM1^Admitting^Provider^adm^^Mrs.^^^Default Authority||VIS_1^^^Default Authority|MED IN1|||||Medicare|||||
ORC|XO|PO_1^Default Authority|FO_1^Default Authority^999.999.999^ISO|SC||||202503191530||||Office1^^^Seaburn - Ordering^^^^^12345&RADIOLOGY|||||PG||202503221230
OBR|1||CT HEAD^CT HEAD^Default Authority|S|||||RCI|||ORP1^Ordering^Provider^orp^^Mr.^^^Default Authority|||||RFS|||PTP&Performing&Tech&ptp&&&&Default Authority||202503221230|||||CT HEAD^CT HEAD^Default Authority|||MSK^MSK^Default Authority
IPC|ACC_1|RP_1|SIUID_1|PS_1|CT||||AE Title
NTE|1|ORDER COMMENT|orderCommentValue|
NTE|2|MEDICAL CHECK TECH NOTES|med check Tech Notes|
CTD|||^^^Grand River Hospital^^^^^GRH&RADIOLOGY
OBX|1|NM^LAB|2345-7^Glucose [Mass/volume] in Serum or Plasma^LN||5.6|mmol/L|3.9-5.5|H||F||20250704
OBX|1|NM^OBS|8867-4^Heart rate^LN||75|/min|60-100|N||F||20250704
OBX|2|NM^OBS|8480-6^Systolic blood pressure^LN||120|mmHg|90-120|N||F||20250704
OBX|3|NM^OBS|8462-4^Diastolic blood pressure^LN||80|mmHg|60-80|N||F||20250704
OBX|4|NM^OBS|59408-5^Oxygen saturation in Arterial blood^LN||98|%|95-100|N||F||20250704
CTD|||^^^Grand River Hospital^^^^^GRH&RADIOLOGY

9.2 Sample HL7 Messages – Outbound

ORM^O01 (single procedure, medical check update):

```
MSH|^~\&|INTELLIGO|RADIOLOGY|RIS INTERFACE|RIS|20250512132701||ORM^O01|10000|P|2.5
PID|||MRN_1^^^Default Authority||Patient^Test^middle^^Mrs^^A~^^^^^^~^^^^^^P||19690715|F
PV1||O|Seaburn - Patient^^^Seaburn - Patient|||||REF1^Referring^Provider^ref^^Miss^^^Default
Authority|||||B9||ADM1^Admitting^Provider^adm^^Mrs.^^^Default Authority||VIS_1^^^Default Authority
AL1|1|FA^Food Allergy|^peanuts|SV^Severe|R~H|202011221530||||Default Authority
ORC|XO|PO_1^Default Authority|FO_1^Default Authority^RADIOLOGY||S|||||12345^^^Seaburn -
Ordering|||||20250322123000
OBR||PO_1^Default Authority|FO_1^Default Authority^RADIOLOGY|CT HEAD^CT HEAD^Default
Authority|S|||||RCI||ORP1^Ordering^Provider^orp^^Mr.^^^Default Authority||ACC_1|RP_1|PS_1|AE
Title|||||RFS|||PTP&Performing&Tech&ptp&&&&Default Authority||20250322123000|||||CT HEAD^CT
HEAD^Default Authority
ZKV|Allergies|No
ZKV|Claustrophobia|No
ZKV|Implants|No
ZKV|Pregnant|Yes
ZDS|1.3.12.2.1107.5.99.3.30000008073014125171700000131
ZMC|NR|20250227062300|jane@wloo^doe^jane|medical check not required
NTE||ORDER COMMENT|orderCommentValue
NTE||MEDICAL CHECK TECH NOTES|mtn notes
DG1|||786.2^Cough^Sx
DG1|||abc123^Fever^Sx
DG1|||782.1^Rash^Sx
DG1|||079^Viral Infection^Dx
DG1|||123^Risk of fall^Rf
DG1|||002.0^TYPHOID FEVER^Hx
DG1|||CL^Claustrophobia^Rf
DG1|||xyz^hives^Hx
OBX|1|NM^LAB|2345-7^Glucose [Mass/volume] in Serum or Plasma^LN||5.6|mmol/L|3.9-5.5|H||F||20250704
OBX|2|NM^OBS|8867-4^Heart rate^LN||75|/min|60-100|N||F||20250704
OBX|3|NM^OBS|8480-6^Systolic blood pressure^LN||120|mmHg|90-120|N||F||20250704
OBX|4|NM^OBS|8462-4^Diastolic blood pressure^LN||80|mmHg|60-80|N||F||20250704
OBX|5|NM^OBS|59408-5^Oxygen saturation in Arterial blood^LN||98|%|95-100|N||F||20250704
```

ORM^O01 (multiple procedures, medical check update):

```
MSH|^~\&|INTELLIGO|RADIOLOGY|RIS INTERFACE|RIS|20250512132701||ORM^O01|10000|P|2.5
PID|||MRN_1^^^Default Authority||Patient^Test^middle^^Mrs^^A~^^^^^^~^^^^^^P||19690715|F
PV1||O|Seaburn - Patient^^^Seaburn - Patient|||||REF1^Referring^Provider^ref^^Miss^^^Default
Authority|||||ADM1^Admitting^Provider^adm^^Mrs.^^^Default Authority||VIS_1^^^Default Authority
ORC|XO|PO_1^Default Authority|FO_1^Default Authority^RADIOLOGY||S|||||12345^^^Seaburn -
Ordering|||||20250322123000
OBR||PO_1^Default Authority|FO_1^Default Authority^RADIOLOGY|CT 123abc^CT HEAD/NECK^Default
Authority|S|||||RCI||ORP1^Ordering^Provider^orp^^Mr.^^^Default Authority||ACC_1|RP_1|PS_1|AE
Title|||||RFS|||PTP&Performing&Tech&ptp&&&&Default Authority||20250322123000|||||CT HEAD^CT
HEAD^Default Authority
ZDS|1.3.12.2.1107.5.99.3.30000008073014125171700000131
ZMC|P|20250227062300|jane@wloo^doe^jane|medical check pending
ORC|XO|PO_1^Default Authority|FO_1^Default Authority^RADIOLOGY||S|||||12345^^^Seaburn -
Ordering|||||20250322123000
OBR||PO_1^Default Authority|FO_1^Default Authority^RADIOLOGY|CT 123abc^CT HEAD/NECK^Default
Authority|S|||||RCI||ORP1^Ordering^Provider^orp^^Mr.^^^Default Authority||ACC_1|RP_2|PS_2|AE
Title|||||RFS|||PTP&Performing&Tech&ptp&&&&Default Authority||20250322124500|||||CT NECK^CT
NECK^Default Authority
ZDS|1.3.12.2.1107.5.99.3.30000008073014125171700000131
ZMC|P|20250227062310|jane@wloo^doe^jane|medical check pending
NTE||ORDER COMMENT|orderCommentValue
NTE||MEDICAL CHECK TECH NOTES|mtn notes
ZKV|Implants|No
```

MSH|^~&|EventServer|RADIOLOGY^HL7_DEMO^L|INTELLIGO|HL7_DEMO|20250512203421.813||ORU^R01^ORU_R01|426|P|2.8.1|80|||||UNICODE UTF-8
PID|1||37117^^^^Default Authority&999.999.999&ISO^PI||Patient^Test^Bob^Mr.^^^L^A||19660625|M
PV1|1|L|^A^Tresco|||||||||786-04-6858^^^^Default Authority&999.999.999&ISO|||||||||||||||||||||V
ORC|OP|31646^Default Authority^999.999.999^ISO|9840641955^Default Authority^999.999.999^ISO||CM
OBR|O|31646^Default Authority^999.999.999^ISO|9840641955^Default
Authority^999.999.999^ISO|XIMNM0131^NM CYSTOGRAM REFLUX ADULT|||20250511161900|||||||||552-44-
1374|45763|||20250512203344|||||F|||||estis egredior quo Longam, novum quartu vantis. Sed plorum in non
Multum rarendum si manifestum fecit. fecundio,|||||||||||||ManufacturerModelName^BlamoNG
OBX|1|RP|1.103.20250511.154900.508.91702.8^NM CYSTOGRAM REFLUX
ADULT^133|1|RP:2:DEMO:DICOM_STUDY:1.103.20250511.154900.508.91702.8^^^^1||||NM||||F|||20250511161
900|RADIOLOGY^Radiology

MSH|^~&|SREP|RADIOLOGY|INTELLIGOMEDICALS|20240624140629.0208||ORU^R01|11630|P|2.5|2|||||ASCII
PID|1||MRN_18^^^Default Authority&999.999.999&ISO^P||Patient^Test^Middle^^^^^A||19690715|A
PV1||N|||||Angelica Donovan|||||||VIS_18|||||||V
ORC|RE|PO_18^Default Authority|FO_18^Default Authority^999.999.999^ISO
OBR||PO_18^Default Authority|FO_18^Default Authority^999.999.999^ISO|XIMSP2043^SP VENOGRAM UPPER
LOWER EXTREMITY RIGHT^Default Authority|||||||C|||||^TestClinicalInfo|user1@localdomain&user
1|user1@localdomain|||20240601
OBX|1|TX|obs^id^L||Patient information|X0A|Name: Middle Patient, Test|X0A|DOB: Jul 15, 1969|X0A|Sex:
Undisclosed|X0A|Patient ID: MRN_18|X0A|Address: N/A|X0A|Phone number: N/A|X0A||X0A|Referred by: Angelica
Donovan|X0A||X0A|Requested procedure information|X0A|ACC#: ACC_18|X0A|Admission type: N/A|X0A|Scheduled
date: Jun 1, 2024|X0A|Performing date: N/A|X0A|Procedure code: XIMSP2043|X0A||X0A||X0A|Report status:
FINALIZED|X0A||X0A||X0A||X0A|Addendum 1|X0A||X0A| ADDENDUM|X0A||X0A|Report finalized on Jun 24, 2024
by:|X0A||X0A|user 1|X0A||X0A||X0A||X0A|Procedure|X0A||X0A|ACC_18|X0A||X0A|Procedure description: SP
VENOGRAM UPPER LOWER EXTREMITY RIGHT|X0A||X0A|Clinical Information|X0A||X0A|Procedure reason:
testNewReason|X0A||X0A|Clinical information:
TestClinicalInfo|X0A||X0A|Comparison|X0A|[.]|X0A||X0A|Findings|X0A|[.]|X0A||X0A|Impression|X0A|[.]|X0A||X0A|O
ntology codes|X0A||X0A||X0A||X0A||X0A|Report finalized on Jun 24, 2024 by:|X0A||X0A|user 1|X0A|||||C

M[SH]~^~&|S[REPI]RADIOLOGY|INTELLIGI|MEDICALS|20240628153827.0010||MDM^T02|11917|P|2.5|1|||||ASCII
PID|1||MRN_18^^^Default Authority&999.999.999&ISO^PI||Patient^Test^Middle^^^^^A||19690715|A
PV1|N|||||Angelica Donovan|||||||VIS_18|||||||V
ORC|RE|PO_18^Default Authority|FO_18^Default Authority^999.999.999^ISO||
OBR||PO_18^Default Authority|FO_18^Default Authority^999.999.999^ISO|XIMSP2043^SP VENOGRAM UPPER
LOWER EXTREMITY RIGHT^Default Authority||||||||C|||||^TestClinicalInfo|user1@localdomain&user
1|user1@localdomain|||20240601
TXA|1|DR|AP|||||||HKvcSxkgvYfM7C7Qz6jau6qdstff6ojc3EgdyoEci3g=||PO_18^Default Authority|ACC_18^Default
Authority^999.999.999^ISO|Diagnostic Imaging Report|AU|||||user1@localdomain&user
1||HKvcSxkgvYfM7C7Qz6jau6qdstff6ojc3EgdyoEci3g=^^99SR
OBX|1|ED|obs^id^L||^application^pdf^Base64^JVBERi0xLjQKMSAwLW9iaGo8PC9UeXBllC9DYXRhbG9nCi9QYWdlcy
YlDAgUgo+PgplbmRvYmoKMIAwLW9iaGo8PC9UeXBllC9QYWdlcwovS2lkcyBbMyAwIFJdCi9Db3VudCAxCj4+CmVuZ
G9iaGoziDAgb2JqCjw8L1R5cGUgU1BhZ2UKL1BhcmVudCAyIDAgUgovTWVkaWFCb3ggWzAgMCA1OTUgODQyXQov
Q29udGVudHMgNSAwFIKL1Jlc291cmNlcyA8PC9Qcm9jU2V0IFsvUERGLC9UZxh0XQovRm9udCA8PC9GMSA0IDA
gUj4+Cj4+Cj4+CmVuZG9iaGo0IDAgb2JqCjw8L1R5cGUgU0ZvbncQKL1N1YnR5cGUgU1R5cGUxci9OYW11IC9GMQovQ
mFzZUZvbncQgL0hlbHlZIDGjYQovRW5jb2RpbmcgU01hY1JvbWUFRW5jb2RpbmcKPi4KZW5kb2JqCjUgMCBvYmoKPD
wvTGvUz3RoIDUzCj4+CnN0cmVhbQpCVAAovRjEgMjAgVGYKMjIwIDQwMCBUZAooRHVtbXkgUERGKSBUagpFVAplbm
RzdHJlYW0KZW5kb2JqCnhyZWYKMCA2CjAwMDAwMDAwMDAgNjU1MzUgZGowMDAwMDAwMDA5IDAwdAwMDAwLW9iaGo8PC9UeXBllC9DYXRhbG9nCi9QYWdlcy
YlDAgUgo+PgplbmRvYmoKMIAwLW9iaGo8PC9UeXBllC9QYWdlcwovS2lkcyBbMyAwIFJdCi9Db3VudCAxCj4+CmVuZG9iaGoziDAgb2JqCjw8L1R5cGUgU1BhZ2UKL1BhcmVudCAyIDAgUgovTWVkaWFCb3ggWzAgMCA1OTUgODQyXQovQ29udGVudHMgNSAwFIKL1Jlc291cmNlcyA8PC9Qcm9jU2V0IFsvUERGLC9UZxh0XQovRm9udCA8PC9GMSA0IDA
gUj4+Cj4+Cj4+CmVuZG9iaGo0IDAgb2JqCjw8L1R5cGUgU0ZvbncQKL1N1YnR5cGUgU1R5cGUxci9OYW11IC9GMQovQmFzZUZvbncQgL0hlbHlZIDGjYQovRW5jb2RpbmcgU01hY1JvbWUFRW5jb2RpbmcKPi4KZW5kb2JqCjUgMCBvYmoKPDwvTGvUz3RoIDUzCj4+CnN0cmVhbQpCVAAovRjEgMjAgVGYKMjIwIDQwMCBUZAooRHVtbXkgUERGKSBUagpFVAplbmRzdHJlYW0KZW5kb2JqCnhyZWYKMCA2CjAwMDAwMDAwMDAgNjU1MzUgZGowMDAwMDAwMDA5IDAwdAwMDAwLW9iaGo8PC9UeXBllC9DYXRhbG9nCi9QYWdlcyYlDAgUgo+PgplbmRvYmoKMIAwLW9iaGo8PC9UeXBllC9QYWdlcwovS2lkcyBbMyAwIFJdCi9Db3VudCAxCj4+CmVuZG9iaGoziDAgb2JqCjw8L1R5cGUgU1BhZ2UKL1BhcmVudCAyIDAgUgovTWVkaWFCb3ggWzAgMCA1OTUgODQyXQovQ29udGVudHMgNSAwFIKL1Jlc291cmNlcyA8PC9Qcm9jU2V0IFsvUERGLC9UZxh0XQovRm9udCA8PC9GMSA0IDA
gUj4+Cj4+Cj4+CmVuZG9iaGo0IDAgb2JqCjw8L1R5cGUgU0ZvbncQKL1N1YnR5cGUgU1R5cGUxci9OYW11IC9GMQovQmFzZUZvbncQgL0hlbHlZIDGjYQovRW5jb2RpbmcgU01hY1JvbWUFRW5jb2RpbmcKPi4KZW5kb2JqCjUgMCBvYmoKPDwvTGvUz3RoIDUzCj4+CnN0cmVhbQpCVAAovRjEgMjAgVGYKMjIwIDQwMCBUZAooRHVtbXkgUERGKSBUagpFVAplbmRzdHJlYW0KZW5kb2JqCnhyZWYKMCA2CjAwMDAwMDAwMDAgNjU1MzUgZGowMDAwMDAwMDA5IDAwdAwMDAwLW9iaGo8PC9UeXBllC9DYXRhbG9nCi9QYWdlcyYlDAgUgo+PgplbmRvYmoKMIAwLW9iaGo8PC9UeXBllC9QYWdlcwovS2lkcyBbMyAwIFJdCi9Db3VudCAxCj4+CmVuZG9iaGoziDAgb2JqCjw8L1R5cGUgU1BhZ2UKL1BhcmVudCAyIDAgUgovTWVkaWFCb3ggWzAgMCA1OTUgODQyXQovQ29udGVudHMgNSAwFIKL1Jlc291cmNlcyA8PC9Qcm9jU2V0IFsvUERGLC9UZxh0XQovRm9udCA8PC9GMSA0IDA
gUj4+Cj4+Cj4+CmVuZG9iaGo0IDAgb2JqCjw8L1R5cGUgU0ZvbncQKL1N1YnR5cGUgU1R5cGUxci9OYW11IC9GMQovQmFzZUZvbncQgL0hlbHlZIDGjYQovRW5jb2RpbmcgU01hY1JvbWUFRW5jb2RpbmcKPi4KZW5kb2JqCjUgMCBvYmoKPDwvTGvUz3RoIDUzCj4+CnN0cmVhbQpCVAAovRjEgMjAgVGYKMjIwIDQwMCBUZAooRHVtbXkgUERGKSBUagpFVAplbmRzdHJlYW0KZW5kb2JqCnhyZWYKMCA2CjAwMDAwMDAwMDAgNjU1MzUgZGowMDAwMDAwMDA5IDAwdAwMDAwLW9iaGo8PC9UeXBllC9DYXRhbG9nCi9QYWdlcyYlDAgUgo+PgplbmRvYmoKMIAwLW9iaGo8PC9UeXBllC9QYWdlcwovS2lkcyBbMyAwIFJdCi9Db3VudCAxCj4+CmVuZG9iaGoziDAgb2JqCjw8L1R5cGUgU1BhZ2UKL1BhcmVudCAyIDAgUgovTWVkaWFCb3ggWzAgMCA1OTUgODQyXQovQ29udGVudHMgNSAwFIKL1Jlc291cmNlcyA8PC9Qcm9jU2V0IFsvUERGLC9UZxh0XQovRm9udCA8PC9GMSA0IDA
gUj4+Cj4+Cj4+CmVuZG9iaGo0IDAgb2JqCjw8L1R5cGUgU0ZvbncQKL1N1YnR5cGUgU1R5cGUxci9OYW11IC9GMQovQmFzZUZvbncQgL0hlbHlZIDGjYQovRW5jb2RpbmcgU01hY1JvbWUFRW5jb2RpbmcKPi4KZW5kb2JqCjUgMCBvYmoKPDwvTGvUz3RoIDUzCj4+CnN0cmVhbQpCVAAovRjEgMjAgVGYKMjIwIDQwMCBUZAooRHVtbXkgUERGKSBUagpFVAplbmRzdHJlYW0KZW5kb2JqCnhyZWYKMCA2CjAwMDAwMDAwMDAgNjU1MzUgZGowMDAwMDAwMDA5IDAwdAwMDAwLW9iaGo8PC9UeXBllC9DYXRhbG9nCi9QYWdlcyYlDAgUgo+PgplbmRvYmoKMIAwLW9iaGo8PC9UeXBllC9QYWdlcwovS2lkcyBbMyAwIFJdCi9Db3VudCAxCj4+CmVuZG9iaGoziDAgb2JqCjw8L1R5cGUgU1BhZ2UKL1BhcmVudCAyIDAgUgovTWVkaWFCb3ggWzAgMCA1OTUgODQyXQovQ29udGVudHMgNSAwFIKL1Jlc291cmNlcyA8PC9Qcm9jU2V0IFsvUERGLC9UZxh0XQovRm9udCA8PC9GMSA0IDA
gUj4+Cj4+Cj4+CmVuZG9iaGo0IDAgb2JqCjw8L1R5cGUgU0ZvbncQKL1N1YnR5cGUgU1R5cGUxci9OYW11IC9GMQovQmFzZUZvbncQgL0hlbHlZIDGjYQovRW5jb2RpbmcgU01hY1JvbWUFRW5jb2RpbmcKPi4KZW5kb2JqCjUgMCBvYmoKPDwvTGvUz3RoIDUzCj4+CnN0cmVhbQpCVAAovRjEgMjAgVGYKMjIwIDQwMCBUZAooRHVtbXkgUERGKSBUagpFVAplbmRzdHJlYW0KZW5kb2JqCnhyZWYKMCA2CjAwMDAwMDAwMDAgNjU1MzUgZGowMDAwMDAwMDA5IDAwdAwMDAwLW9iaGo8PC9UeXBllC9DYXRhbG9nCi9QYWdlcyYlDAgUgo+PgplbmRvYmoKMIAwLW9iaGo8PC9UeXBllC9QYWdlcwovS2lkcyBbMyAwIFJdCi9Db3VudCAxCj4+CmVuZG9iaGoziDAgb2JqCjw8L1R5cGUgU1BhZ2UKL1BhcmVudCAyIDAgUgovTWVkaWFCb3ggWzAgMCA1OTUgODQyXQovQ29udGVudHMgNSAwFIKL1Jlc291cmNlcyA8PC9Qcm9jU2V0IFsvUERGLC9UZxh0XQovRm9udCA8PC9GMSA0IDA
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