



HL7 INTERFACE SPECIFICATIONS

ORU: OBSERVATION RESULTS

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Introduction

This section describes HL7 Specifications. The unidirectional interface enables study results to be transferred electronically.

The on-premise gateway supports HL7 Standard Versions 2.x. Version 2.5.1 or higher is expected unless otherwise noted.

Interface Workflow

ORU HL7 messages are processed by the on-premise gateway. The HL7 elements are then mapped to the appropriate fields.

Supported HL7 Escape Sequences

The following HL7 escape sequences are supported in the HL7 connector. The sequence is supported for both inbound HL7 messages and outgoing HL7 ACK and NACK responses:

Escape Sequence	Converted Character Sequence
\E\	Backslash (\)
\F\	Replaced with the field separator defined in MSH.1, usually (pipe)
\R\	Replaced with the repetition separator defined in MSH.2, usually ~ (tilde)
\S\	Replaced with the component separator defined in MSH.2, usually ^ (carat)
\T\	Replaced with the sub-component separator defined in MSH.2, usually & (ampersand)
\.br\	<p>Begin a new output line. Set the horizontal position to the current left margin and increment the vertical position by 1.</p> <p>Example: Using the following incoming message fragment:</p> <pre>A loop of colon visible in the left upper\.br\quadrant is distinctly abnormal.</pre> <p>The resulting message may be displayed like this on supported devices:</p> <pre>A loop of colon visible in the left upper quadrant is distinctly abnormal.</pre>
\Xnnnn\	<p>Hexadecimal data.</p> <p>Represents a double-byte character in hexadecimal form. The hexadecimal digits A-F can be upper or lower case.</p> <p>The hexadecimal value can be two or four hexadecimal digits long. Only the last four hexadecimal digits are used if more than four are specified. The value \X00\ is not supported. All other values are supported, but may not resolve to a visible character.</p> <p>Example: Using the following incoming message fragment:</p> <pre>Patient: Fran\X00e7\ois Leduc\X0d\\\X0a\Temperature: 37.2 \XB0\C</pre> <p>Will resolve to the following in Spok Go:</p> <pre>Patient: François Leduc Temperature: 37.2 °C</pre>

NOTE: Escape sequences are case sensitive and cannot contain a nested escape sequence.

Unsupported Escape Sequences

The following escape or formatting sequences are currently not supported and will be removed from the incoming HL7 messages. These sequences will not be emitted in outbound HL7:

Escape Sequence	Converted Character Sequence
\H\	Start highlighting
\N\	End highlighting
\.sp<number>\	End current line and insert <number> spaces.
\.fi\	Begin word wrap or fill mode.
\.nf\	Begin no-wrap mode.
\.in<+/-number>\	Indent <number> of spaces.
\.ti<+/-number>\	Temporarily indent <number> of spaces.
\.sk<number>\	Skip <number> of spaces to the right.
\.ce\	End current output line and center the next line.

ORU – Observation Results

The HL7 ORU-R01 message may be used to transmit result data from the producing system to a medical record archival system, or to another system not part of the original order process.

Key:	
[]	Optional segment
{ }	1+ occurrences, repeated

Segment/ Group	Name	Notes	Repeatable	Required
MSH	Message Header			✓
Results Group - Includes groups that follow ¹				✓
Patient Group				✓
PID	Patient Identification			✓
[{ NTE }]	Notes and Comments for Patient Group		✓	
Patient Visit Group - Part of Patient Group				
PV1	Patient Visit			✓
[PV2]	Patient Visit - Additional Information			
Order Group			✓	✓
[{ ORC]	Order Common			
OBR	Observation Request			✓
[{ NTE }]	Notes and Comments for Order Group		✓	
Observation Group - Part of Order Group			✓	✓
[{ OBX	Observation Result			✓ ²
[{ NTE }] }] }	Notes and Comments for Observation Group		✓	

1. Although HL7 specifications for ORU-R01 and ORU-R40 messages states that the Results group can be repeated, we accept one and only one results group in these ORU messages.

2. Although the HL7 specifications for ORU-R01 and ORU-R40 messages allows the Observation Group and therefore the OBX segment to be optionally included, we require the inclusion of the OBX segment.

ORU Header Segments

An ORU must contain one and only one MSH Segment and contain one or more optional NTE Segment.

MSH Segment

The HL7 MSH (Message Header) segment is present in every HL7 message type and defines the message's source, purpose and destination. It is always the first segment in the HL7 message.

HL7 Field	Description	Required	Notes
MSH:1	Field Separator	✓	
MSH:2	Encoding Characters	✓	
MSH:3.1	Sending Application	✓	
MSH:4.1	Sending Facility	✓ ¹	
MSH:5.1	Receiving Application	✓ ¹	
MSH:6.1	Receiving Facility	✓ ¹	
MSH:7.1	Date Time	✓	
MSH:9.1	Event Type	✓	ORU
MSH:9.2	Event Trigger	✓	R01, R40
MSH:10	Message Control ID	✓	
MSH:11.1	Processing Identifier	✓	
MSH:12	Version ID	✓	2.5.1 or greater

1. Required for possible future routing of response messages.

NTE Segment

The HL7 NTE (Notes and Comments) segment is used for sending notes and comments related to the message.

HL7 Field	Description	Required	Notes
NTE:3.1	Comment		

Results Group

The Results group contains a collection of Patient Groups. Although HL7 specifications state that the Results group can be repeated, we accept one and only one results group be present in an ORU message.

Patient Group

The Patient group requires one and only one PID Segment, one required Patient Visit Group instance and a repeatable list of Order Groups.

PID Segment

The PID (Patient Identification) segment is required in an HL7 ORU message. This segment contains the patient's identifying information such as the patient's name, gender, account and record numbers.

HL7 Field	Description	Required	Repeating	Notes
PID:2.1	Patient ID Number			The first ID repetition received in this field will be stored with the patient for possible inclusion in subsequent outbound messages.
PID:2.4	Patient ID Assigning Authority			
PID:2.5	Patient ID Type Code			
PID:3.1	Patient Identifier ID Numbers	✓		Multiple Patient Identifier repetitions are supported in PID:3. At least one repetition is required to be a Medical Record Number (MRN) with a type code of "MR" and a facility-specific assigning authority. All identifier repetitions received in this field will be stored with the patient for possible inclusion in subsequent outbound messages.
PID:3.4	Patient Identifier Assigning Authorities	✓		
PID:3.5	Patient Identifier Type Codes	✓		
PID:5.1	Patient Last Name	✓		
PID:5.2	Patient First Name	✓		
PID:5.3	Patient Middle Name			
PID:5.4	Patient Suffix			
PID:7.1	Patient Birth Date	✓		
PID:8.1	Patient Gender			
PID:13.1	Phone Number - Home			The phone number in the first component of each repetition will be stored with the patient. "NET" is needed to accept an email address in PID:13
PID:13.2	Telecommunication Use Code			
PID:13.5	Email Address - Home			
PID:14.1	Phone Number - Work			The phone number in the first component of each repetition will be stored with the patient. "NET" is needed to accept an email address in PID:14
PID:14.2	Telecommunication Use Code			
PID:14.5	Email Address - Work			
PID:15.2	Primary Language			

PID:18.1	Patient Account Number			
PID:18.4	Patient Account Assigning Authority			This field is required if a Patient Account Number is provided in PID:18.1
PID:29	Patient Death Date and Time			
PID:30	Patient Death Indicator			

NTE Segment

The HL7 NTE (Notes and Comments) segment is used for sending notes and comments related to the patient.

HL7 Field	Description	Required	Notes
NTE:3.1	Comment		

Patient Visit Group

The ORU Patient Visit Group must contain a single PV1 Segment and can contain an optional PV2 Segment.

PV1 Segment (Required)

The PV1 segment is primarily used to identify the location of the patient.

This segment is required for successful processing because the workflow engine cannot determine the appropriate flow without patient class and location information.

HL7 Field	Description	Required	Repeating	Notes
PV1:2.1	Patient Class	✓		E, I, or O are processed. All others are rejected.
PV1:3.1	Location – Point of Care	✓ (I/E)		Unit or Department
PV1:3.2	Location – Room	✓ (I/E)		
PV1:3.3	Location – Bed	✓ (I/E)		
PV1:3.4	Location – Facility	✓		
PV1:7.1	Attending Physician ID			
PV1:7.2	Attending Physician Last Name			
PV1:7.3	Attending Physician First Name		✓	
PV1:7.9	Assigning Authority for Attending Physician ID ¹			
PV1:8.1	Referring Physician ID			
PV1:8.2	Referring Physician Last Name			
PV1:8.3	Referring Physician First Name		✓	
PV1:8.9	Assigning Authority for Referring Physician ID ¹			
PV1:9.1	Consulting Physician ID			
PV1:9.2	Consulting Physician Last Name			
PV1:9.3	Consulting Physician First Name		✓	
PV1:9.9	Assigning Authority for Consulting Physician ID ¹			

HL7 Field	Description	Required	Repeating	Notes
PV1:10.2	Hospital Service Text			
PV1:11.1	Temporary Location – Point of Care			Location other than the assigned location required for a temporary period of time (e.g., OR, operating theatre, etc.).
PV1:11.2	Temporary Location – Room			
PV1:11.3	Temporary Location – Bed			
PV1:11.4	Temporary Location – Facility			
PV1:17.1	Admitting Physician ID		✓	
PV1:17.2	Admitting Physician Last Name			
PV1:17.3	Admitting Physician First Name			
PV1:17.9	Assigning Authority for Admitting Physician ID ¹			
PV1:18.1	Patient Type			
PV1:19.1	Visit Number			
PV1:19.4	Visit Number Assigning Authority			This field is required if a Visit Number is provided in PV1:19.1
PV1:36.2	Discharge Disposition Text			PV1:36 is supported as a CWE datatype (pre-adopted from HL7 2.7)
PV1:44.1	Admit Date/Time			
PV1:45.1	Discharge Date/Time ¹			
PV1:53	Service Episode Description			A brief user-defined description of a Service Episode in or for which the visit occurs.

1. Assigning authorities for user IDs need to match one of Spok Go's supported External Systems in order to resolve the ID to a Spok Go user.

2. If multiple date/time values are present, the first occurrence is used.

PV2 Segment

The PV2 segment is a continuation of visit-specific information contained in the PV1 segment. This segment is currently not required but is included here for future consideration.

HL7 Field	Description	Required	Repeating	Notes
PV2:3.2	Patient Admit Reason			
PV2:4.2	Transfer Reason Text			This field contains the short description of the reason for a patient location change.
PV2:12	Visit Description			This field contains a brief user-defined description of the visit.
PV2:25.2	Visit Priority Code Text			Examples of some of the visit priorities that may be sent in this field include: <ul style="list-style-type: none"> - Emergency - Urgent - Elective (based on HL7 table 0217)
PV2:41.2	Precaution Code Text		✓	Examples of some of the possible precautions that may be sent in this field include: <ul style="list-style-type: none"> - Aggressive - Blind - Confused - Deaf - On IV - Paraplegic (based on HL7 table 0433)
PV2:45.2	Advance Directive Code Text			Examples of some of the possible text that may be sent in this field include: <ul style="list-style-type: none"> - Do not resuscitate - No directive (based on HL7 table 0435) Note: PD1:15 and PV2:45 are redundant to each other. If both fields are valued, only the visit-level value from PV2:45 will be used. PV2:45 is supported as a CWE datatype (pre-adopted from HL7 2.7)

Order Group

The Order Group is a repeatable group containing an optional ORC Segment, a required OBR Segment, and an optional, repeatable Observation Group.

ORC Segment

The ORC segment is not required for Observation Results (ORU) messages.

HL7 Field	Description	Required	Notes
ORC:1.1	Order Control	✓	
ORC:2.1	Placer Order Number	✓ ¹	This is the same as OBR:2.1 Placer Order Number
ORC:3.1	Filler Order Number (aka: Accession Number)	✓ ²	This is the same as OBR:3.1 Filler Order Number
ORC:7.6	Order Priority	✓ ³	The supported single-letter priority values in order, from high to low, are: S=Stat, A=ASAP, R=Routine, P=Preop, T=Timed
ORC:11.1	Authorizing Provider ID		
ORC:11.2	Authorizing Provider Last Name		
ORC:11.3	Authorizing Provider First Name		
ORC:11.9	Assigning Authority for Authorizing Provider ID ⁴		
ORC:12.1	Ordering Provider ID	Expected ⁵	This is expected to be the same as the Ordering Provider in OBR:16 - if different, the ordering provider in ORC:16 will supersede OBR:12's ordering provider. If more than one Ordering Provider is received in this field, only the first repetition will be used.
ORC:12.2	Ordering Provider Last Name		
ORC:12.3	Ordering Provider First Name		
ORC:12.9	Assigning Authority for Ordering Provider ID ⁴	Expected	
ORC:14.1	Callback Phone Number	Expected ⁶	
ORC:16.2	Order Control Code Reason		

- At least one of the following identifiers must be provided: Placer Order Number (ORC:2.1) or Placer Order Number (OBR:2.1). If both identifiers are present, OBR:2.1 will supersede ORC:2.1.
- At least one of the following identifiers must be provided: Filler Order Number (ORC:3.1) or Filler Order Number (OBR:3.1). If both identifiers are present, OBR 3.1 will supersede ORC:3.1.
- A value is required in either ORC:7.6 or OBR:27.6. The highest value from one of these elements will be used to determine the message's priority. When unsupported values are provided, single-letter or otherwise (ex: "STAT" instead of "S"), the priority value from the first ORC or OBR instance is used.
- Assigning authorities for user IDs need to match one of Spok Go's supported External Systems in order to resolve the ID to a Spok Go user.
- At least one of the following identifiers must be provided: Attending Physician ID (PV1:7.1), Referring Physician ID (PV1:8.1), Consulting Physician ID (PV1:9.1), Admitting Physician ID (PV1:17.1), Ordering Provider ID (ORC:12.1), or Ordering Provider ID (OBR:16.1).
- If both ORC:14.1 and OBR:17.1 are present, OBR:17.1 will supersede ORC:14.1. If multiple phone numbers are present, the first occurrence is used.

OBR Segment

The OBR segment is required for Observation Results (ORU) messages.

HL7 Field	Description	Required	Notes
OBR:2.1	Placer Order Number	✓ ¹	This is the same as ORC:2.1 Placer Order Number
OBR:3.1	Filler Order Number (aka: Accession Number)	✓ ²	This is the same as ORC:3.1 Filler Order Number
OBR:4.1	Universal Service Code	✓	
OBR:4.2	Universal Service Text	✓	Spok Go's alerts do not currently support clickable links/URLS
OBR:7.1	Observation Date Time	✓	
OBR:13	Relevant Clinical Information		
OBR:16.1	Ordering Provider	Expected ³	This is expected to be the same as the Ordering Provider in ORC:12 - if different, the ordering provider in ORC:16 will supersede OBR:12's ordering provider. If more than one Ordering Provider is received in this field, only the first repetition will be used.
OBR:16.2	Ordering Provider Last Name		
OBR:16.3	Ordering Provider First Name		
OBR:16.9	Assigning Authority for Ordering Provider ID ⁴	Expected	
OBR:17.1	Order Callback Phone Number	Expected ⁵	
OBR:22.1	Results Rpt / Status Change Date / Time		
OBR:25.1	Observation Status		The supported single letter observation status values include A=Partial results available, P=Preliminary, F=Final, or C=Correction
OBR:27.6	Priority	✓ ⁶	The supported single-letter priority values in order, from high to low, are: S=Stat, A=ASAP, R=Routine, P=Preop, T=Timed
OBR 32.1 ⁷	Results Interpreter ID		
OBR:32.1.2 ⁷	Results Interpreter Last Name		
OBR:32.1.3 ⁷	Results Interpreter First Name		
OBR:32.1.9 ⁷	Results Interpreter Assigning Authority ⁴		

HL7 Field	Description	Required	Notes
OBR:34.1 ⁷	Technician ID		OBR:34's Technician info will be used as the Result Interpreter when OBR:32 is absent
OBR:34.1.2 ⁷	Technician Last Name		
OBR:34.1.3 ⁷	Technician First Name		
OBR:34.1.9 ⁷	Technician Assigning Authority ⁴		

- At least one of the following identifiers must be provided: Placer Order Number (ORC:2.1) or Placer Order Number (OBR:2.1). If both identifiers are present, OBR:2.1 will supersede ORC:2.1.
- At least one of the following identifiers must be provided: Filler Order Number (ORC:3.1) or Filler Order Number (OBR:3.1). If both identifiers are present, OBR 3.1 will supersede ORC:3.1.
- At least one of the following identifiers must be provided: Attending Physician ID (PV1:7.1), Referring Physician ID (PV1:8.1), Consulting Physician ID (PV1:9.1), Admitting Physician ID (PV1:17.1), Ordering Provider ID (ORC:12.1), or Ordering Provider ID (OBR:16.1).
- Assigning authorities for user IDs need to match one of Spok Go's supported External Systems in order to resolve the ID to a Spok Go user.
- If both ORC:14.1 and OBR:17.1 are present, OBR:17.1 will supersede ORC:14.1. If multiple phone numbers are present, the first occurrence is used.
- A value is required in either ORC:7.6 or OBR:27.6. The highest value from one of these elements will be used to determine the message's priority. When unsupported values are provided, single-letter or otherwise (ex: "STAT" instead of "S"), the priority value from the first ORC or OBR instance is used.
- Note that most of the Interpreter and Technician info in OBR:32 and OBR:34 is communicated as HL7 subcomponents (ex: |12345&Last&First&&&&&AsgnAuth) within that field's first "Name (CNN)" component.

NTE Segment

The HL7 NTE (Notes and Comments) segment is used for sending notes and comments related to the order.

HL7 Field	Description	Required	Notes
NTE:3.1	Comment		

Observation Group

The Observation Group contains an OBX Segment and an optional, repeatable list of NTE segments.

OBX Segment

Data is primarily obtained from OBX 3.2 where the result text resides. The additional fields provide supplemental information for Laboratory results.

HL7 Field	Description	Required	Notes
OBX:1.1	Set ID	✓	
OBX:2.1 ¹	Value Type	✓	When value type is Numeric (NM), OBX:6.1 and OBX:7.1 are required
OBX:3.1	Identifier Code	✓	
OBX:3.2	Identifier Text	✓	
OBX:5.1 ²	Observation Value		
OBX:6.1	Units	✓ (NM)	
OBX:7.1	Reference Range	✓ (NM)	
OBX:8.1 ²	Result Abnormal Flags (i.e. Message Importance)		Supported values include: ³ <ul style="list-style-type: none"> • "Panic", "Critical", "HH", "HU", "LL", "LU", "AA", "A", and "4" • "High", "H" and "3" • "Normal", "N", "2" • "Low" or "L", or "1" Any other values, if received, will be ignored.
OBX:16.1	Responsible Observer ID		
OBX:16.2	Responsible Observer Last Name		
OBX:16.3	Responsible Observer First Name		
OBX:16.9	Assigning Authority for Responsible Observer ID ⁴		

1. See the OBX Value Type Handling section of these specs for details regarding the supported value types.
2. Although HL7 allows for both OBX:5 and OBX:8 to be repeating fields, Spok Go only supports repeating OBX:5 instances when the value type in OBX:2 is "TX" or text. Repeating values are never supported in OBX:8.
3. Some mapping within the customer's interface engine may be necessary to provide the values that are supported. The highest Abnormal Flag/Message Importance value from all the observations in a message will be used to indicate the importance of the overall alert while each observation's Abnormal Flag/Message Importance will also affect how each observation is displayed within an alert.
4. Assigning authorities for user IDs need to match one of Spok Go's supported External Systems in order to resolve the ID to a Spok Go user.

NTE Segment

The HL7 NTE (Notes and Comments) segment is used for sending notes and comments related to the observation.

HL7 Field	Description	Required	Notes
NTE:3.1	Comment		

OBX Value Type Handling

Spok Go supports the following value types in OBX:2

OBX:2 Value Type	Processing Details
CE Coded Element	<ul style="list-style-type: none"> OBX:3.2 and OBX:5.1 will be forwarded for possible display.
CWE Coded Entry	<ul style="list-style-type: none"> OBX:3.2 and OBX:5.1 will be forwarded for possible display.
DT Date	<ul style="list-style-type: none"> OBX:3.2 and OBX:5.1 will be forwarded for possible display. ISO formatting will be applied to valid date strings.
FT Formatted Text	<ul style="list-style-type: none"> Consecutive OBX segments with the same contents in OBX:3.2 will have their OBX:5 contents combined into a single text block. HL7 line field encoding (ex: \.br\) supported Unique OBX:3.2 values and any combined OBX:5 contents will be forwarded for possible display.
ID Coded Value for HL7 Defined Tables	<ul style="list-style-type: none"> OBX:3.2 and OBX:5.1 will be forwarded for possible display.
IS Coded Value for User Defined Tables	<ul style="list-style-type: none"> OBX:3.2 and OBX:5.1 will be forwarded for possible display.
NM Numeric	<ul style="list-style-type: none"> OBX:3.2, OBX:5.1, OBX:6.1 and OBX:7.1 will be forwarded for possible display.
RP Reference Pointer	<ul style="list-style-type: none"> OBX:3.2 and OBX:5.1 will be forwarded for possible display.
SN Structured Number	<ul style="list-style-type: none"> OBX:3.2, OBX:5, OBX:6.1 and OBX:7.1 will be forwarded for possible display. Up to 4 subcomponents are supported in OBX:5 where the separators will be replaced by spaces in order to create the structured number value (ex: >^1^/ ^2 = "> 1 / 2").
ST String Data	<ul style="list-style-type: none"> Consecutive OBX segments with the same contents in OBX:3.2 will have their OBX:5 contents combined into a single text block. HL7 field repetition characters (ex: ~) supported for line feeds Unique OBX:3.2 values and any combined OBX:5 contents will be forwarded for possible display.
TS Time Stamp	<ul style="list-style-type: none"> OBX:3.2 and OBX:5.1 will be forwarded for possible display. ISO formatting will be applied to valid date strings.
TX Text Data	<ul style="list-style-type: none"> Consecutive OBX segments with the same contents in OBX:3.2 will have their OBX:5 contents combined into a single text block. HL7 field repetition characters (ex: ~) supported for line feeds Unique OBX:3.2 values and any combined OBX:5 contents will be forwarded for possible display.

Spok Go does not support the following value type in OBX:2

OBX:2 Value Type	Processing Details
ED Encapsulated Data	<ul style="list-style-type: none"> Spok Go cannot accept/display the level of formatting that an encapsulated data string is trying to communicate. OBX segments with an ED value type will be ignored in ORU messages that contain a mix of other value types. ORU messages that only contain OBX segments with ED data type(s) will be NAK'ed

Any other OBX:2 value type that is received will be handled as individual observations where OBX:3.2 and OBX:5.1 will be forwarded for possible display.

Support External Systems

The table below contains the values supported as Practitioner Assigning Authorities (usually in the 9th component of a practitioner/physician field), which in conjunction with an associated practitioner/physician ID field, is used to uniquely identify each practitioner in incoming HL7 messages.

Values	
Active Directory	PeopleSoft
Agfa	Philips
Allscripts	Quanum
Athena	SailPoint
Cactus	Sectra
Carestream	ServiceNow
Cerner	Siemens
Centricity	Thermofisher
Cirdan	Vista
Epic	Workday
Fujifilm	
GE	
IBM	
Kestral	
Kronos	
Lawson	
Lexmark	
Meditech	
NPPES	