SPACELABS
HEALTHCARE

Rothman® Index
HL7 Outbound Interface Specification

HL7 Specification Version 2.5.1
Document Version 5.1

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1 Specification Overview

1.1. Purpose

The purpose of this interface document is to specify the expected interactions between Spacelab's Rothman Index product suite and the customer's electronic health record and ancillary systems.

1.2. Related Documents

The following documents are related to this specification:

- HL 7 Standard version 2.5.1. This document is available from the HL7 website: http://www.hl7.org
- HL7 Inbound Specifications version 5.3.

1.3. Conventions

1.3.1. Usage

Usage defines whether or not the field is required to be populated with data or not.

Value	Description	Comment
R	Required	The element must be received with a non-empty value. If an empty value is received, the message will not be processed.
RE	Required but can be empty	The element can be received with an empty value, but it is required to be populated when there is relevant data.

1.3.2. Repetition

Repetition defines if the field repeats, allowing for more than one value to be included.

Value	Description	Comment
N	No repetition	Only a single value is expected to arrive in this field.
Y	The field may repeat	Multiple values can be included in the field, and will be interpreted appropriately.

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1.4. Revision History

Version	Author	Comments
4.0 (01/26/2018)	jross@perahealth.com Senior Software Architect	Finalize for 4.0 release.
4.0	cmadison@perahealth.com Chief Architect, VP of Technology	Initial release supporting V4 product suite
5.0	cfurlong@perahealth.com Vice President of Development & Chief Architect	Uplift to new branding
5.1	Lorelyn Akins Sr. Product Lifecycle Manager	Updated to Spacelabs Branding

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2 General Considerations

The section outlines general considerations for implementing an interface that receives ORU messages transmitting Rothman Index scores and Warnings from RI Server.

2.1 HL7 Version

RI Server supports HL 7 version 2.5.1. RI Server leverages MLLP over TCP/IP. HL7 messages must conform to the HL7 Minimal LLP block format:

- HL7 messages start with 0x0B and ends with 0x1C and 0x0D
- HL7 segments are terminated with a 0x0D

Note that segment separators will always be a carriage return (ASCII 13 or HEX 0D). This may not be shown in the following examples, but all segments will be separated by carriage return in accordance with HL7 standards.

2.2 Message Delimiters

Delimiter	Value
Segment Terminator	<cr> [0x0D]
Field Separator	|
Component Separator	^
Subcomponent Separator	&
Repetition Separator	~
Escape Character	\

2.3 Supported HL7 Transactions

The following HL7 transactions are supported by RI Server.

- ORU R01 Unsolicited Observation Message

2.4 Date-Time Format

RI Server leverages ISO 8601 short-hand format with time zone offset adjusted for HL7.

```
FORMAT:     yyyyMMddHHmmss+0000
yyyy = year
MM = month
dd = day
HH = 24-hour time
```


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```
mm = minutes
ss = seconds
+0000 = timezone offset, +0000 to be used for UTC time
```

2.5 Patient Identifiers

The following format is for patient identifiers in RI Server:

```
<ID>^^^<Facility>^<HL7 Type – HL7 Table 0203>
```

Multiple patient identifiers must be separated by a tilde "~".
Example:

```
84035703^^^FAC1^MR~123456789^^^FAC1^SS
```

2.6 MSH Segment Validation

The following table represents the expected and required values in the MSH header segment sent outbound from RI Server:

MSH Field	Usage	Guidance
MSH-3 Sending Application	R	Literal: PERALINK
MSH-4 Sending Facility	R	Literal: PERAHEALTH
MSH-5 Receiving Application	R	<configurable>
MSH-6 Receiving Facility	R	<configurable>
MSH-7 Date/Time of Message	R	Time stamp, see section 2.4 of this document
MSH-9 Message Type	R	As defined by HL7 v2.5.1.
MSH-10 Message Control ID	R	Unique message identifier
MSH-11 Processing ID	R	Literal: 'P' in production, 'T' in others
MSH-12 Version	R	Literal: 2.5.1

3 Rothman Index HL7 Outbound

Spacelabs's Rothman Index software can be configured to have an HL7 outbound interface to send Rothman Index (RI) scores and warnings back to the customer's EMR system. The outbound interface has an ORU HL7 message format. The values for new or updated RI scores and new or expired alerts uses standard values (F,C,D) defined below. The outbound channel will send the appropriate message to a specific destination.

Customer will need to specify message destination (IP and port).

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Whenever an RI score or alert is calculated it will be sent outbound in near real-time. Note that previous RI scores may be recalculated based on new data being received.

> *Example: An RI score may be calculated at 10am based on vital signs and nursing assessments. At 1pm, lab work comes back for blood drawn at 10am. The RI score from 10am will be updated to reflect the lab results from that time.*

The updated RI score will be sent outbound with an indicator that it is an updated value.

Similarly, both new and updated RI scores may cause an alert to be activated or cancelled. The alert message includes an indicator if the alert is active or expired.

3.1 ORU-R01 - Rothman Index Scores

3.1.1 Message Structure

ORU	ORU Message	HL7 2.5.1 Chapter
MSH	Message Header	2.15.9
PID	Patient Identification	3.4.2
PV1	Patient Visit	3.4.3
OBR	Observation Request	4.5.3
{OBX}	Observation	7.4.2

3.1.2 Message Format:

```
MSH|^~\&|PERALINK|PERAHEALTH||||CURRENT-DATE||ORU^R01|MSG-CTRL|P|2.5.1
PID|1||PID-LIST|||PATIENT-NAME||||||||||||VISITACCT-VALUE|
PV1|1||PATIENT-LOCATION|||||||||||||||VISITNUM-VALUE|||||||||||||||||||
OBR|1|||85556-9^Rothman Index^LN|||SCORE-DATE|
OBX|1|NM|452901000124109^Rothman Index^SCT||HLTHSCORE||||||F|||SCORE-
DATE|HLTHSCORE-ID
```

3.1.3 Message Semantics

Segment	SEQ	Usage	Repetition	Element Name	Example Contents	Comments
MSH	7	R	N	Current Date	20231010000000+0000	See Section 2.4
	10	R	N	MSG-CTRL	544421	A positive monotonically increasing integer

Segment	SEQ	Usage	Repetition	Element Name	Example Contents	Comments
PID	3	R	N	PID-LIST	84035703^^^FAC1^MR ~123456789^^^FAC1^SS +0000	Patient ID. See section 2.5
	5	R	N	PATIENT-NAME	PAXTON^BILL	LASTNAME^FIRSTNAME^MI
	18	R	N	VISITACCT-VALUE	2342342	Account number related to visit
PV1	3*	RE	N	PATIENT-LOCATION	5 EAST^201^1^FAC1	FLOOR^UNIT^ROOM^FACILITY
	19	R	N	VISITNUM-VALUE	400073777	Visit number associated to visit
OBR	7	R	N	SCORE-DATE	19871010000000+0000	Rothman Index score date
OBX	14	R	N	HLTHSCORE	17	Rothman Index
	15	R	N	HLTHSCORE-ID	^Braden Score Total	Unique id for each score
	11	R	N	Observation Result Status	C	Final (F), Corrected (C), Deletion (D)

3.1.4 Message Samples

```
MSH|^~\&|PERALINK|PERAHEALTH||||20170213110423+0500||ORU^R01|1|P|2.5.1
PID|1||172181905^^^MSK^SS~219389763962697^^^MSK^MR|||PAXTON^BILL||||||||||||777|
PV1|1||8North^5506^701^MSK|||||||||||||781947787466161|||||||||||||||||||
OBR|1|||85556-9^Rothman Index^LN|||20170213110423+0500|
OBX|1|NM|452901000124109^Rothman Index^SCT||82||||||F|||20170213110423+0500|372
```

3.2 ORU-R01 - Rothman Index Warnings

A significant update to the Spacelab's Rothman Index product suite is the use of warnings that aggregate multiple alerts. Warnings may have many alerts. However, RI Trend will only report the aggregate of the alerts as a warning. Only one warning will be associated to an HL7 message as defined below.

3.2.1 Message Structure

ORU	ADT Message	HL7 2.5.1 Chapter
MSH	Message Header	2.15.9
PID	Patient Identification	3.4.2

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PV1	Patient Visit	3.4.3
OBR	Observation Request	4.5.3
{OBX}	Observation	7.4.2

3.2.2 Message Format:

```
MSH|^~\&|PERALINK|PERAHEALTH||||CURRENT-DATE||ORU^R01^ORU_R01|MSG-CTRL|P|2.5.1
PID|1||PID-LIST||PATIENT-NAME|||||||||||||VISITACCT-VALUE
PV1|1||PATIENT-LOCATION|||||||||||||||VISITNUM-VALUE
OBR|1|||^WARNING^PERAHEALTH|||CREATED-DATE|END-DATE|||||||||CAT-NAME
OBX|1|ST|WARNING-ID^ALERT-NAMES^PERAHEALTH||CAT-CODE||||||RESULT-STATUS|||EFF-DATE
```

3.2.3 Message Semantics

Segment	SEQ	Usage	Repetition	Element Name	Example Contents	Comments
MSH	7	R	N	CURRENT-DATE	20231010000000+0000	See Section 2.4
	10	R	N	MSG-CTRL	544421	A positive monotonically increasing integer
PID	3	R	N	PID-LIST	84035703^^^FAC1^MR ~123456789^^^FAC1^SS +0000	Patient ID. See section 2.5
	5	R	N	PATIENT-NAME	PAXTON^BILL	LASTNAME^FIRSTNAME^MI
	18	R	N	VISITACCT-VALUE	2342342	Account number related to visit
PV1	3*	RE	N	PATIENT-LOCATION	5 EAST^201^1^FAC1	FLOOR^UNIT^ROOM^FACILITY
	19	R	N	VISITNUM-VALUE	400073777	Visit number associated to visit
OBR	7	R	N	CREATED-DATE	20231010000000+0000	The date and time the warning was created.
	8	R	N	END-DATE	20231020000000+0000	The date and time when the warning ends or ended.
	18	R	N	CAT-NAME	Very High	Name of the warning category

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Segment	SEQ	Usage	Repetition	Element Name	Example Contents	Comments
						Very High High Medium
OBX	3-1	R	N	WARNING-ID	5454112	The warning ID assigned by RI Trend.
	3-2	R	N	ALERT-NAMES	RI < 40\20% Drop in 12 hours	A semicolon delimited list of alert names that are contributing to the warning. Semicolons and backslashes within alert names will be escaped by a backslash ('\').
	5	R	N	CAT-CODE	V	The code of the warning category (i.e. risk level). V = Very High H = High M = Medium
	11	R	N	RESULT-STATUS	C	The observation result status. F – The warning is active. C – The warning is still active but has had an alert added or removed. D – The warning has elapsed or been canceled.
	14	R	N	EFF-DATE	17	The recorded date and time of the nursing assessment (see Section 2.4).

3.2.4. Message Samples

Warning Generated:

```
MSH|^~\&|PERATREND|PERAHEALTH|||20180126132055-
0700||ORU^R01^ORU_R01|2018012620205554|P|2.5.1
PID|||WCH101844^^^WCH^MR^WCH~845769644^^^WCH^SS^WCH||DOE^JOHN||||||||||||WCH101844
PV1|||11SOUTH^102^1^WCH|||||||||||||||WCH101844|||||||||||||||||||WCH
OBR||||^WARNING^PERAHEALTH|||20171018125000-0600|20171019125000-0600|||||||||Very
High Risk
OBX||ST|43^First RI < 40^PERAHEALTH||V||||||F|||20171018125000-0600
```

Warning Expired:

```
MSH|^~\&|PERATREND|PERAHEALTH|||20180126101844-
0700||ORU^R01^ORU_R01|201801261718441|P|2.5.1
PID|||WCH101844^^^WCH^MR^WCH~845769644^^^WCH^SS^WCH||DOE^JOHN||||||||||||WCH101844
PV1|||11SOUTH^102^1^WCH|||||||||||||||WCH101844|||||||||||||||||||WCH
OBR||||^WARNING^PERAHEALTH|||20171018125000-0600|20171019125000-0600|||||||||Very
High Risk
OBX||ST|25^First RI < 40^PERAHEALTH||V||||||D|||20171018125000-0600
```


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