



PaxeraHealth
Transforming Healthcare Through Innovation

HL7 Interface Specification

Compliance Statement

2018

All materials in this document are copyright of PaxeraHealth Corporation. Microsoft and Windows are trademarks of Microsoft Corporation. The information presented in this document is correct at time of press, however, it is subject to change without notice. This document may not be photocopied, reproduced, or translated into another language, in whole or in part, without the consent of PaxeraHealth Corporation.

TABLE OF CONTENTS

INTRODUCTION.....	3
Communication Protocol.....	3
MESSAGE DETAILS	3
Supported HL7 Message Types	3
HL7 Message Description	4
General Acknowledgment Message (ACK).....	4
PATIENT ADMIT/DISCHARGE/TRANSMIT (ADT).....	5
Transfer a patient (Event A02).....	5
Discharge/End visit (Event A03).....	6
Register a patient (Event A04)	6
Change an Outpatient to an Inpatient (Event A06)	7
Change an Inpatient to an Outpatient (Event A07)	7
Update Patient Information (Event A08)	7
Patient Departing - tracking (Event A09)	8
Cancel Admit / Visit Notification (Event A11)	9
Cancel Transfer (Event A12).....	9
Cancel Discharge / End Visit (Event A13)	9
Swap Patients (Event A17).....	10
Merge Patient Information (Event A18).....	11
Merge Person Information (Event A30)	11
Cancel Patient Arriving - Tracking (Event A32).....	12
Cancel Patient Departing - Tracking (Event A33).....	13
Merge patient information - Patient ID only (Event A34)	13

ORDER MESSAGES (ORM)	14
General Order Message (Event O01)	14
General Order Response Message (Event ORRO2)	14
OBSERVATION REPORTING (ORU)	15
Observation Reporting Message (Event ORUR01)	15
QUERY MESSAGES (QRY)	16
Patient Query (Event A19)	16
Query Response (ADR)	16
SCHEDULING MESSAGES (SIU)	16
Notification of New Appointment Booking (Event S12)	16
EXAMPLE SEGMENTS	17

INTRODUCTION

PaxeraHealth Solutions provides a broker-less PACS/RIS interface. This means that both the offered PACS and RIS can recognize both DICOM and HL7 messages. This document gives a brief overview of PaxeraHealth Solutions' HL7 PACS/RIS Interface. The interface is based on the HL7 version 2.4 definitions. Modules communicating using previous HL7 versions should have no communication problem due to the backward compatibility nature of the HL7 standard.

Communication Protocol

The PACS/RIS communicate using TCP-IP socket interface, implementing the HL7 "Minimal Lower Layer Protocol".



MESSAGE DETAILS

Supported HL7 Message Types

HL7 supports a wide variety of hospital events including scheduling, reporting, patient administration, patient care, financial events, etc.

Not every department in a health care system would be interested in sending/receiving all different kinds of events. Therefore, it is of great importance for a good HL7 interface to be smart enough to "choose" the types of events that would satisfy the health care needs of every department. A system with so many unnecessary transmitted messages would only cause high network traffic which can degrade the performance of the healthcare system.

Listed below, is a list of the message types supported by **PaxeraHealth Solutions**:

Message Type	Description
ACK	General Acknowledgment message.
ADT	Patient Admit/Discharge/Transfer message
ORM	Order message.
ORR	Order Acknowledgment message
ORU	Observation Reporting
QRY	Query message
SIU	Scheduling message

Table 1: Supported Message Types

HL7 Message Description

An HL7 message can be described as a normal character string that is divided into segments. Each segment contains data related to a specific information category. For example, the PID segment contains a patient’s basic personal information (name, sex, address, etc.), the IN1 segment contains information related to the patient’s insurance status (company, expiration data, etc.).

Message segments can have one or more of the following characteristics:

- **Required:** This is due when the message segment contains information that always exists and should be available for reliable healthcare information flow. For example, the PID (Patient Identification) segment contains ‘always-existing’ data elements (name, sex, date of birth, etc.) that must be available to link the patient to the healthcare system.
- **Optional:** This is due when the message segment contains information that either can be missing or irrelevant to certain patients. For example, a patient that doesn’t suffer from any allergy will not need the allergy-related segment (AL1). An optional segment is denoted by brackets [].
- **Can Repeat:** This is due when information for a certain instance can exist more than one time. For example, a patient vulnerable to more than one allergy would use more than one AL1 (Allergy Information) segment. If a segment can repeat, it will be denoted by braces {}. If it both optional and can repeat, it will be denoted by < >.

General Acknowledgment Message (ACK)

When a healthcare department sends an HL7 message, it usually needs a feedback from the host. This feedback is needed to make sure that the host received the message successfully and managed to process it correctly.

Message Direction

Input / Output

Message Structure

Segment	Description
MSH	Message Header
MSA	Message Acknowledgment
[ERR]	Error

Table 2: ACK Message Structure

PATIENT ADMIT/DISCHARGE/TRANSMIT (ADT)

ADT messages are related to events concerning patient administration events. Such events include patient admittance, transfer, discharge, tracking, and information update. The supported ADT messages are described below.

Admit/Visit Notification (Event A01)

An A01 event is sent as a result of a patient undergoing the admission process which assigns the patient to a bed. It signals the beginning of a patient's stay in the healthcare facility.

Message Direction

Input / Output

Message Structure

Segment	Description
MSH	Message Header
EVN	Event Type
PID	Patient Identification
<NK1>	Next of Kin
PV1	Patient Visit
<OBX>	Observation
<AL1>	Allergy Information
<PR1>	Procedures
<IN1>	Insurance

Table 3: ADTA01 Message Structure

Transfer a patient (Event A02)

An A02 event is issued as a result of the patient changing his or her assigned physical location.

Message Direction

Input / Output

Message Structure

Segment	Description
MSH	Message Header
EVN	Event Type
PID	Patient Identification
PV1	Patient Visit
<OBX>	Observation

Table 4: ADTA02 Message Structure

Discharge/End visit (Event A03)

An A03 event signals the end of a patient's stay in the healthcare facility. It signals that the patient has completed the discharge process.

Message Direction

Input / Output

Message Structure

Segment	Description
MSH	Message Header
EVN	Event Type
PID	Patient Identification
PV1	Patient Visit
<PR1>	Procedures
<OBX>	Observation

Table 5: ADTA03 Message Structure

Register a patient (Event A04)

An A04 event signals that the patient has arrived or checked in as an outpatient, and is not assigned to a bed.

Message Direction

Input / Output

Message Structure

Segment	Description
MSH	Message Header
EVN	Event Type
PID	Patient Identification
<NK1>	Next of Kin
PV1	Patient Visit
<OBX>	Observation
<AL1>	Allergy Information
<PR1>	Procedures
<IN1>	Insurance

Table 6: ADTA04 Message Structure

Change an Outpatient to an Inpatient (Event A06)

An A06 event is sent when it is decided that a registered patient is to be admitted. This situation usually occurs after an evaluation of the seriousness of the patient’s condition.

Message Direction

Input / Output

Message Structure

Segment	Description
MSH	Message Header
EVN	Event Type
PID	Patient Identification
MRG	Merge Patient Information
<NK1>	Next of Kin
PV1	Patient Visit
<OBX>	Observation
<AL1>	Allergy Information
<PR1>	Procedures
<IN1>	Insurance

Table 7: ADTA06 Message Structure

Change an Inpatient to an Outpatient (Event A07)

An A07 event is sent when a patient who was admitted changes his/her status to “no longer admitted” but is still being seen for this episode of care.

Message Direction:

Input / Output

Message Structure

Segment	Description
MSH	Message Header
EVN	Event Type
PID	Patient Identification
MRG	Merge Patient Information
<NK1>	Next of Kin
PV1	Patient Visit
<OBX>	Observation
<AL1>	Allergy Information
<PR1>	Procedures
<IN1>	Insurance

Table 8: ADTA07 Message Structure

Update Patient Information (Event A08)

This trigger event is used when any patient information has changed. For example, an A08 event can be used to notify the receiving systems of a change of address or a name change. This message cannot be used to notify of information associated with other trigger events.

Message Direction

Input / Output

Message Structure

Segment	Description
MSH	Message Header
EVN	Event Type
PID	Patient Identification
MRG	Merge Patient Information
<NK1>	Next of Kin
PV1	Patient Visit
<OBX>	Observation
<AL1>	Allergy Information
<PR1>	Procedures
<IN1>	Insurance

Table 9: ADTA08 Message Structure

Patient Departing - tracking (Event A09)

The A09 event is used when there is a temporary change in a patient's physical location. This does not include a change in the patient's assigned bed.

Message Direction

Input / Output

Message Structure

Segment	Description
MSH	Message Header
EVN	Event Type
PID	Patient Identification
PV1	Patient Visit
<OBX>	Observation

Table 10: ADTA09 Message Structure

The A10 event is sent when a patient arrives at a new location in the healthcare facility.

Message Direction

Input / Output

Message Structure

Segment	Description
MSH	Message Header
EVN	Event Type
PID	Patient Identification
PV1	Patient Visit
<OBX>	Observation

Table 11 ADTA10 Message Structure

Cancel Admit / Visit Notification (Event A11)

The A11 event is sent when an A01 (admit/visit notification) event is canceled, either because of an erroneous entry of the A01 event, or because of a decision not to admit the patient.

Message Direction

Input / Output

Message Structure

Segment	Description
MSH	Message Header
EVN	Event Type
PID	Patient Identification
PV1	Patient Visit
<OBX>	Observation

Table 12: ADTA11 Message Structure

Cancel Transfer (Event A12)

The A12 event is sent when an A02 (transfer a patient) event is canceled, either because of erroneous entry of the A02 event or because of a decision not to transfer the patient.

Message Direction

Input / Output

Message Structure

Segment	Description
MSH	Message Header
EVN	Event Type
PID	Patient Identification
PV1	Patient Visit
<OBX>	Observation

Table 13: ADTA12 Message Structure

Cancel Discharge / End Visit (Event A13)

The A13 event is sent when an A03 (discharge/end visit) event is canceled, either because of erroneous entry of the A03 event or because of a decision not to discharge or end the visit of the patient.

Message Direction

Input / Output

Message Structure

Segment	Description
MSH	Message Header
EVN	Event Type
PID	Patient Identification
<NK1>	Next of Kin
PV1	Patient Visit
<OBX>	Observation
<AL1>	Allergy Information
<PR1>	Procedures
<IN1>	Insurance

Table 14: ADTA13 Message Structure

Swap Patients (Event A17)

The A17 is used when it is decided that two patients will exchange beds.

Message Direction

Input

Message Structure

Segment	Description
MSH	Message Header
EVN	Event Type
PID	Patient 1 Identification
PV1	Patient 1 Visit
<OBX>	Patient 1 Observation
PID	Patient 2 Identification
PV1	Patient 2 Visit
<OBX>	Patient 2 Observation

Table 15: ADTA17 Message Structure

Merge Patient Information (Event A18)

The A18 event is used to merge patient information related to the same patient that is linked to two different identification numbers. This is required, for example, when a previous patient is registered under a new patient identification number because of an error, or because the actual patient identification number was not determined. The merge event is used to combine the information under either the new or the old identifier.

Message Direction

Input / Output

Message Structure

Segment	Description
MSH	Message Header
EVN	Event Type
PID	Patient Identification
MRG	Merge Patient Information
PV1	Patient Visit

Table 16: ADTA18 Message Structure

Merge Person Information (Event A30)

An A30 event can be used to merge a person's information in an MPI (Master Patient Index).

Message Direction

Input

Message Structure

Segment	Description
MSH	Message Header
EVN	Event Type
PID	Patient Identification
MRG	Merge Patient Information

Table 17: ADTA30 Message Structure

Update Person Information (Event A31)

An A31 event can be used to update person information on an MPI. It can also be used for backloading MPI information for the person, or for backloading person and historical information.

Message Direction

Input

Message Structure

Segment	Description
MSH	Message Header
EVN	Event Type
PID	Patient Identification
<NK1>	Next of Kin
PV1	Patient Visit
<OBX>	Observation
<AL1>	Allergy Information
PR1	Procedures
IN1	Insurance

Table 18: ADTA31 Message Structure

Cancel Patient Arriving - Tracking (Event A32)

The A32 event is sent when an A10 (patient arriving-tracking) event is canceled, either because of erroneous entry of the A10 event or because of a decision not to receive the patient.

Message Direction

Input

Message Structure

Segment	Description
MSH	Message Header
EVN	Event Type
PID	Patient Identification
PV1	Patient Visit
<OBX>	Observation

Table 19: ADTA32 Message Structure

Cancel Patient Departing - Tracking (Event A33)

The A33 event is sent when an A09 (patient departing-tracking) event is canceled.

Message Direction

Input

Message Structure

Segment	Description
MSH	Message Header
EVN	Event Type
PID	Patient Identification
PV1	Patient Visit
<OBX>	Observation

Table 20: ADTA33 Message Structure

Merge patient information - Patient ID only (Event A34)

An A34 event is intended for merging or changing patient identifiers. It would be used to change patient identifiers on all of this patient's existing accounts.

Message Direction

Input

Message Structure

Segment	Description
MSH	Message Header
EVN	Event Type
PID	Patient Identification
<OBX>	Observation
MRG	Merge Patient Information

Table 21: ADTA34 Message Structure

ORDER MESSAGES (ORM)

Order messages are used to transmit orders or information about orders between healthcare departments that need the order and those that fulfill the order, and other applications as needed. An order is a request for material or services, usually for a specific patient. Examples can be films from radiology, linens from housekeeping, supplies from central supply, etc.

General Order Message (Event O01)

The function of this message is to initiate the transmission of information about an order. This includes placing new orders, cancellation of existing orders, discontinuation, holding, etc. The trigger event for this message is any change to an order. Such changes include submission of new orders, cancellations, updates, patient and nonpatient-specific orders, etc.

Message Direction

Input / Output

Message Structure

Segment	Description
MSH	Message Header
[PID]	Patient Identification
[PV1]	Patient Visit
<IN1>	Insurance
<AL1>	Allergy Information
{ORC}	Common Order
{OBR}	Observation Request
<NTE>	Notes and Comments
<OBX>	Observation

Table 22 ORM001 Message Structure

General Order Response Message (Event ORRO2)

The function of this message is to respond to an ORM message; i.e. It is the application acknowledgment to an ORM message.

Message Direction

Input / Output

Message Structure

Segment	Description
MSH	Message Header
MSA	Message Acknowledgement
[ERR]	Error
[PID]	Patient Identification
[PV1]	Patient Visit
{ORC}	Common Order
{OBR}	Observation Request
<NTE>	Notes and Comments

Table 23: ORR002 Message Structure

OBSERVATION REPORTING (ORU)

The main goal of observation reporting is to send structured patient-oriented clinical data from one computer system to another. Such data may be observations and results of diagnostic studies from the producing system (e.g., laboratory, image viewing station, etc.), to the ordering system (e.g., HIS order entry, physician's office) or to archival medical record systems.

Observation Reporting Message (Event ORUR01)

A clinical report is sent in the ORUR01 message. It is formed as a three-level hierarchy, with the PID (Patient Identification) segment at the upper level, an order record (OBR) at the next level and one or more observation records (OBX) at the bottom. One result segment (OBX) is transmitted for each component of a diagnostic report.

Message Direction

Input / Output

Message Structure

Segment	Description
MSH	Message Header
[PID]	Patient Identification
[PV1]	Patient Visit
<ORC>	Common Order
{OBR}	Observation Request
<NTE>	Notes and Comments
<OBX>	Observation

Table 24: ORUR01 Message Structure

QUERY MESSAGES (QRY)

Patient Query (Event A19)

A QRYA 19 message is used when certain patient information is needed in a healthcare department. The receiver replies to the sender's request for data by a Query Response message (ADR).

Message Direction

Output

Message Structure

Segment	Description
MSH	Message Header
QRD	Query Definition
[QRF]	Query Filter

Table 25: QRYA19 Message Structure

Query Response (ADR)

Message Direction

Input / Output

SCHEDULING MESSAGES (SIU)

Scheduling messages are needed to communicate various events related to the scheduling of appointments for services or for the use of resources.

Notification of New Appointment Booking (Event S12)

This message is sent from a filler application to notify other applications that a new appointment has been booked. The information provided in the SCH segment and the other detail segments as appropriate describe the appointment that has been booked by the filler application.

Message Direction

Input

Message Structure

Segment	Description
MSH	Message Header
SCH	Scheduling Activity Information
<NTE>	Notes and Comments
<PID	Patient Identification
[PV1]	Patient Visit
<OBX>>	Observation
{RGS}	Resource Group

Table 27: SIUS12 Message Structure

EXAMPLE SEGMENTS

Next, we give a few examples of the structures of some data segments used. The table headers are described below:

SEQ: Sequence number of the data component in the segment

Element Name: The name of the segment data component

DT: HL7 defined data type used to hold the element

OPT: Optionality field. It can take one of the following values

R: HL7 Required Field

R1: Optional, but is recommended

O: Optional

RPT: Indicates if a field can repeat

PID: *Patient Identification Segment*

Seq	Element Name	DATA TYPE	OPT	RPT
1	Set ID – PID	SI		
2	Patient ID	CX		
3	Patient Identifier List	CX	R	Y
4	Alternate Patient ID - PID	CX		Y
5	Patient Name	XPN	R	Y
6	Mother’s Maiden Name	XPN		Y
7	Date/Time of Birth	TS	R1	
8	Sex	IS	R1	
9	Patient Alias	XPN		Y
10	Race	CE		Y
11	Patient Address	XAD	R1	Y1
12	County Code	IS		
13	Phone Number - Home	XTN	R1	Y
14	Phone Number - Business	XTN	R1	Y
15	Primary Language	CE		
16	Marital Status	CE	R1	
17	Religion	CE	R1	
18	Patient Account Number	CX		
19	SSN Number - Patient	ST	R1	
20	Driver's License Number- Patient	DLN	R1	
21	Mother's Identifier	CX		Y
22	Ethnic Group	CE		Y
23	Birth Place	ST		
24	Multiple Birth Indicator	ID		
25	Birth Order	NM		
26	Citizenship	CE		Y
27	Veterans Military Status	CE		
28	Nationality	CE	R1	
29	Patient Death Date and Time	TS		
30	Patient Death Indicator	ID		
31	Identity Unknown Indicator	ID		
32	Identity Reliability Code	IS		
33	Last Update Date/Time	TS		
34	Last Update Facility	HD		
35	Species Code	CE		
36	Breed Code	CE		
37	Strain	ST		
38	Production Class Code	CE		

Table 28: PID field definitions

Patient Allergy Information Segment

SEQ	ELEMENT NAME	DATA TYPE	OPT	RPT
1	Set ID - AL1	SI	R	
2	Allergy Type	IS	O	
3	Allergy	CE	R	
	Code/Mnemonic/Description			
4	Allergy Severity	IS	O	
5	Allergy Reaction	ST	O	Y
6	Identification Date	DT	O	

Table 29: AL1 Field Definitions

MRG - Patient Merge Information Segment

SEQ	ELEMENT NAME	DATA TYPE	OPT	RP/#
1	Prior Patient Identifier List	CX	R	Y
2	Prior Alternate Patient ID	CX	O	Y
3	Prior Patient Account Number	CX	O	
4	Prior Patient ID	CX	O	
5	Prior Visit Number	CX	O	
6	Prior Alternate Visit ID	CX	O	
7	Prior Patient Name	XPN	R1	Y

Table 30: MRG Field Definitions

QRD - Query Definition Segment

SEQ	ELEMENT NAME	DATA TYPE	OPT	RPT
1	Query Date/Time	TS	R	
2	Query Format Code	ID	R	
3	Query Priority	ID	R	
4	Query ID	ST	R	
5	Deferred Response Type	ID	O	
6	Deferred Response Date/Time	TS	O	
7	Quantity Limited Request	CQ	R	
8	Who Subject Filter	XCN	R	Y
9	What Subject Filter	CE	R	Y
10	What Department Data Code	CE	R	Y
11	What Data Code Value Qual.	CM	O	Y
12	Query Results Level	ID	O	

Table 31: QRD Field Definitions

ORC – Common Order Segment

SEQ	ELEMENT NAME	DATA TYPE	OPT	RP/#
1	Order Control	ID	R	
2	Placer Order Number	EI	C	
3	Filler Order Number	EI	C	
4	Placer Group Number	EI	O	
5	Order Status	ID	O	
6	Response Flag	ID	O	
7	Quantity/Timing	TQ	O	
8	Parent	CM	O	
9	Date/Time of Transaction	TS	R1	
10	Entered By	XCN	R1	Y
11	Verified By	XCN	O	Y
12	Ordering Provider	XCN	O	Y
13	Enterer's Location	PL	O	
14	Call Back Phone Number	XTN	O	Y/2
15	Order Effective Date/Time	TS	O	
16	Order Control Code Reason	CE	O	
17	Entering Organization	CE	O	
18	Entering Device	CE	O	
19	Action By	XCN	O	Y
20	Advanced Beneficiary Notice Code	CE	O	

Table 32: ORC Field Definitions