

HL7 Conformance Statement

Product **Image-Arena 4.2**
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1 Revision History

Rev	Date (YYYY-MM-DD)	Author	Reason	Changes
INI	2008-08-01	HKra	Initial	Initial
02	2009-01-22	RSle	New Feature	New: Send Images via HL7 (OnKeyNote / link to JPG/...)
03	2009-11-16	RSle	New Feature	Receive HL7 Message (Patient Update / Patient Merge) Change of Semantic file structure



2 Abbreviations

ADT	Admission, Discharge, and Transfer message
EVN	Event Type segment
HL7	Health Level 7
IHE	Integrating the Healthcare Enterprise
DICOM	Digital Imaging and Communication in Medicine
MFN	Master Files Change Notification
MRG	Merge Patient Information segment
MSH	Message Header segment
NTE	Notes and comments segment
OBR	Observation Request segment
OBX	Observation Result segment
ORC	Common Order segment
ORM	Order Request message
ORU	Observation Results - Unsolicited message
PID	Patient ID segment
PV1	Patient Visit segment
RIS	Radiology Information System

3 Related Documents

HL7 Standard v 2.3.1

4 Purpose and intended audience

This document is a HL7 Conformance Statement for the HL7 Services associated with Image-Arena 4.2 software.

We assume that the reader is familiar with the terminology and concepts that are used in HL7 2.3.1 standard. Readers not familiar with HL7 terminology should first read the appropriate parts of the HL7 standard itself, prior to reading this conformance statement.

Although the use of this conformance statement in conjunction with the HL7 standard is intended to facilitate communication with Image-Arena, it is not sufficient to guarantee, by itself, the inter-operation of the connection between Image-Arena and the 3rd party HL7-based system.



5 Functional overview for HL 7 send

The Image-Arena DICOM Store SCP service receives DICOM studies including DICOM accession numbers. Pointing on this unique ID Image-Arena can send observations results from imaging based findings, diagnoses, recommendations and calculations over a HL7 message (V2.3.1). The provided message type is ORU/ACK (unsolicited transmission of an observation message (event R01)).

The HL7 message transmission can be triggered by the following Image-Arena events:

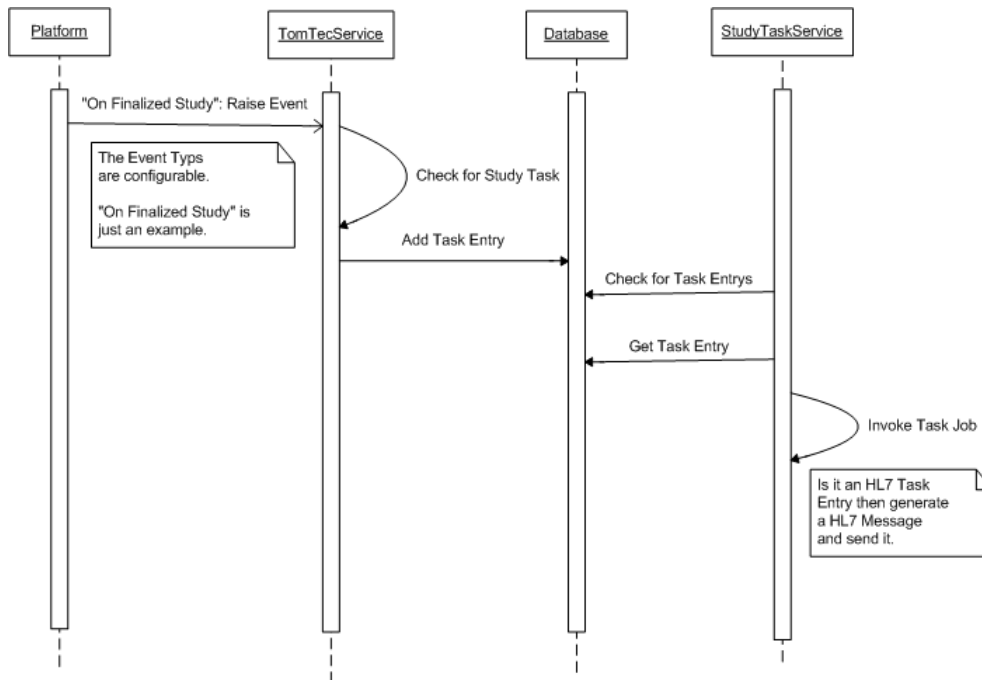
- OnNewStudy
- OnAnalyzed
- OnComplete
- OnFinalize
- OnDelete
- OnNewDicomFile
- OnStudyLock
- OnStudyUnlock
- OnPatientReconciliation
- OnStudyReconciliation
- OnMeasureComplete
- OnManualMeasureEdit

It is possible to transmit observation results in the formats

- ASCII
- PDF
- UNC



The transmission of a HL7 message is described below:



The Platform (Image-Arena and the TomTec DICOM Service) can raise a system event. The system event is handled at the TomTec service that creates the specific task in the task database table. If a new task is created the TomTec study task service performs the required action (e.g. transmit a HL7 ORU Message)

5.1 Configuration of the HL7 send Message

The HL7 communication configuration is performed in the Server manager. The following information needs to be setup:



Name	Description
Destination Name	Name of the HL7 ORU message receiver
TCP/IP Address	IP Address of the destination (entry required)
Port Number	Port number of the destination (entry required)
Activation Event	Drop down list of events that can be activated by Image-Arena: <ul style="list-style-type: none"> - OnNewStudy - OnAnalyzed - OnComplete - OnFinalize - OnDelete - OnNewDicomFile - OnStudyLock - OnStudyUnlock - OnPatientReconciliation - OnStudyReconciliation - OnMeasureComplete - OnManualMeasureEdit
Message semantic file:	Define the required HL7 semantic file.

5.2 Configuration of the HL7 semantic file

Each message type that should be transmitted to a defined HL7 host must be configured in a specific "HL7 semantic file". In this semantic file each HL7 field of each segment can be defined. The fields can be filled with static text (e.g. MSH-3 = Image-Arena), with defined database entries (e.g. Patient ID, finding values,...) or with time stamps.

Folder Semantic files: GlobalConfig\HL7SemanticFiles\.

The semantic file has the following structure:

```

=====
[ACK]
;NO_ACK_EXPECTED
;IGNORE_ACK_CONTENT
ACK_MSH
ACK_MSA

[ACK_MSH]
01 = MSH
02 = ^~\&

```



:
:
:

14 = ;ContinuationPointer
15 = AL ;AcceptAcknowledgmentType
16 = NE ;ApplicationAcknowledgmentType

[ACK_MSA]
01 = MSA
02 = AA
03 = TT-10005-PR
04 =
05 =
06 =

[Message]
MSH
PID
OBR
ORC
PV1
OBX
ZDS

[MSH]
01 = MSH
02 = ^~\&
03 = Image-Arena ;SendingApplication
:
:
17 = DEU ;CountryCode
18 = ISO8859-1 ;CharacterSet
19 = DEU ;PrincipalLanguage

[PID]
01 = PID
02 =
:
:

=====



Each HL7 semantic file contains in the section [Message] a list of all HL7 Segments it contains. The order of the segments in this list is equal to the order in the HL7 message.

After the [Message] section all sections of the message to be transmitted are defined in detail. It is possible to define static information (e.g. MSH-3 = Image-Arena). Patient and examination related information are pasted directly via database links in the according HL7 field.

5.3 List of Database information that can be added in the HL7 message

5.3.1 Targets

###RQ.TGT_HL7_CONTROL.RQ_GET_TIME_STAMP.TimeStamp

Adds the current time stamp

###RQ.TGT_HL7_CONTROL.RQ_GET_MESSAGE_CONTROLID.ControlID

Add a increment (but not unique) Number for the Messages

###RQ.TGT_HL7_CONTROL.RQ_GET_ENCAPSULATED_PDF.EncapsulatedPDF

Converts TomTec based reports (template based and structured report) to pdf and places this pdf document in the defined field.

###RQ.TGT_HL7_CONTROL.RQ_GET_ENCAPSULATED_PDF_WITHOUT_FINDING_RECORDS.EncapsulatedPDF

Converts TomTec based reports (template based) to pdf and places this pdf document in the defined field.

###RQ.TGT_HL7_CONTROL.RQ_GET_LINK_TO_PDF.LinkToPDF

###RQ.TGT_HL7_CONTROL.RQ_GET_LINK_TO_PDF_WITHOUT_FINDING_RECORDS.LinkToPDF

###RQ.TGT_HL7_CONTROL.RQ_GET_LINK_TO_PDF_USE_STUDYUID_AS_FILENAME.LinkToPDF

###RQ.TGT_HL7_CONTROL.RQ_GET_LINK_TO_PDF_WITHOUT_FINDING_RECORDS_USE_STUDYUID_AS_FILENAME.LinkToPDF

###RQ.TGT_HL7_CONTROL.RQ_GET_LINK_TO_PDF_WITHOUT_PATH_AS_FILENAME.LinkToPDF

###RQ.TGT_HL7_CONTROL.RQ_GET_LINK_TO_PDF_WITHOUT_FINDING_RECORDS_WITHOUT_PATH_AS_FILENAME.LinkToPDF

###RQ.TGT_HL7_CONTROL.RQ_GET_LINK_TO_PDF_USE_STUDYUID_AS_FILENAME_WITHOUT_PATH_AS_FILENAME.LinkToPDF

###RQ.TGT_HL7_CONTROL.RQ_GET_LINK_TO_PDF_WITHOUT_FINDING_RECORDS_USE_STUDYUID_AS_FILENAME_WITHOUT_PATH_AS_FILENAME.LinkToPDF

###RQ.TGT_HL7_CONTROL.RQ_GET_LINK_TO_JPG.LinkToJPG

###RQ.TGT_HL7_CONTROL.RQ_GET_LINK_TO_JPG_WITHOUT_PATH_AS_FILENAME.LinkToJPG

###RQ.TGT_HL7_CONTROL.RQ_CHECK_TIME_STAMP.TimeStamp;



###RQ.TGT_HL7_CONTROL.RQ_IGNORE_FIELD.FieldContent;

5.3.2 Data container information

Data container information belongs to the currently active or handled study and derives directly out of the Image-Arena database. They can be added in the desired field with the following syntax:

###DC.[Data Field]###

5.3.2.1 Data Fields

DateModified
DicomAccessionNo
DicomStudyId
Hospital
LastModified
LastReview
ModalityString
PatientOccupation
PatientSizePatientUID
PatientWeight
ReferringPhysician
Reported
StudyDate
StudyDescription
Finalized
StudyTime
StudyType

5.3.2.2 Data field related to the „finalizer“ of a study

###DC.Finalized.[Data Field]

FamilyName
GivenName
MiddleName
NamePrefix
NameSuffix



PhysicianUID

5.3.2.3 Data field related to the patient demographics

###DC.Patient.[Data Field]

DateOfBirth

DicomPatientId

FamilyName

GivenName

MiddleName

NamePrefix

NameSuffix

PatientUID

Sex

5.3.3 Measurement Information

It is possible to add all available measurements (for the active study) in a HL7 messages Field in follow syntax.

TTFD~[Finding]~[DataType]

For additional Patient Information in your Measurements use follow syntax:

TTFR.[DataFields]

Note: Between TTFD and / or TTFR defines can you write a separator. In this sample is it a "___"

TTFR.[DataFields] ___*** TTFD~[Finding]~[DataType]***

5.3.3.1 TTFD (TomTecFinDings) configuration



The [Finding] must include the complete internal TomTec FindingId from this measurement. A FindingId is depends from installed Mapping Files and the Mapping configuration.

The [DataType] includes follow possibilities to show the FindindId data content.

- Description → description for the Measurement
- FindingId → the internal TomTec FindinsId as Text
- ValueToUse → the Value of the FindindId as Text

5.3.3.2 TTFR (TomTecfindingRecord) configurations

This is a part the available Patient Information in a Measurement Field.

```
***TTFR.ContentDate***
***TTFR.ContentTime***
***TTFR.FindingsRecordUID***
***TTFR.Series.Study.DateModified***
***TTFR.Series.Study.DicomAccessionNo***
***TTFR.Series.Study.DicomStudyId***
***TTFR.Series.Study.Hospital***
***TTFR.Series.Study.LastReview***
***TTFR.Series.Study.PatientOccupation***
***TTFR.Series.Study.PatientSize***
***TTFR.Series.Study.PatientWeight***
***TTFR.Series.Study.ReferringPhysician***
***TTFR.Series.Study.Reported***
***TTFR.Series.Study.StudyDate***
***TTFR.Series.Study.StudyDescription***
***TTFR.Series.Study.StudyTime***
***TTFR.Series.Study.StudyType***
***TTFR.Series.Study.Patient.DateOfBirth***
***TTFR.Series.Study.Patient.DicomPatientId***
***TTFR.Series.Study.Patient.FamilyName***
***TTFR.Series.Study.Patient.GivenName***
***TTFR.Series.Study.Patient.MiddleName***
***TTFR.Series.Study.Patient.NamePrefix***
***TTFR.Series.Study.Patient.NameSuffix***
***TTFR.Series.Study.Patient.PatientUID***
```



TFR.Series.Study.Patient.Sex

5.3.3.3 Sample for the Measurement Information in a Field

[OBX]

...

17 = ***TTFD~US.CA.EchoText.LV.Recommendation~ValueToUse***

TTFD~US.CA.EchoText.LV.Echogenity~ValueToUsValue

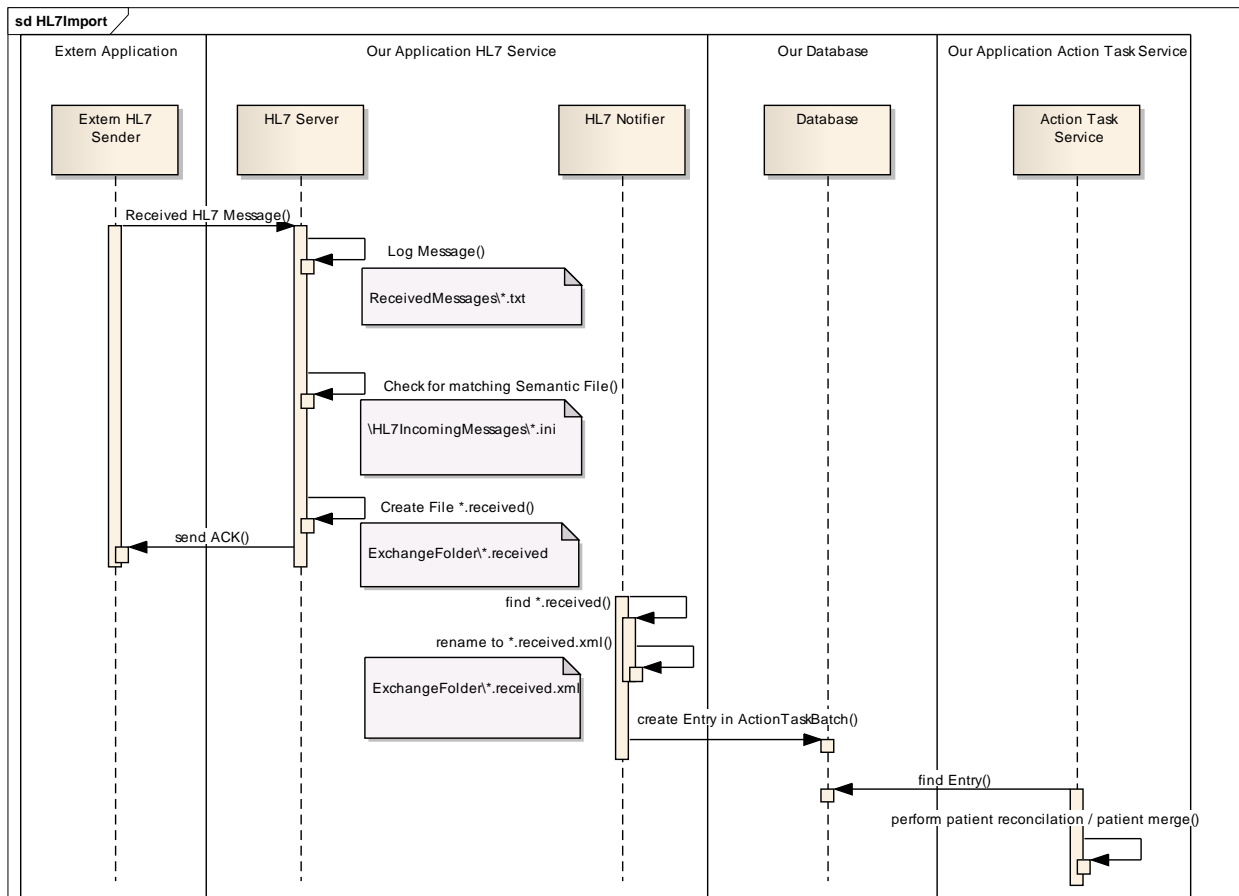
TTFD~US.CA.EchoText.LV.Index~ValueToUse

TTFD~US.CA.EchoText.LV.Circulation~FindingId

***TFR.ContentDate; Field 17 in OBX

6 Functional overview for HL 7 receive

The Image-Arena HL7 Service receives HL7 Messages and creates an Action Task entry for each configured message type. The "Patient merge" and "Patient update" processing is an Action Task functionality.



6.1 Configuration of the HL7 received Message

The HL7 Server configuration is defined in the .\GlobalConfig\HL7.ini and not supported in the TomTec Server Manager.

Name	Description
ReceivedMessageLog	Folder for the History Log of all received Messages
ReceiveFolder	Folder for the XML Files (the XML Files are generate by HL7 Service and used by the Action Task Service)
IP	Our HL7 Server IP
Port	Our HL7 Server Port
ActionTaskLifeTime	Validity in milliseconds for all HL7 Actions Task. This value overrides the current Action Task Lifetime.
WaitForReadAndWrite	Timeout for TCP Socket settings "ready read" and "ready write" in milliseconds
WaitForConnectAndDisconnect	Timeout for TCP Socket settings "wait for connect" and "wait for disconnect" in milliseconds
MaxCountOfHL7MessageLogFiles	Maximum count of the incoming out outgoing HL7 message in the separate logging folders (Folders are defined in ReceivedMessageLog and SendMessageLog

6.2 Configuration of the HL7 semantic file

Folder Semantic files: GlobalConfig\HL7IncomingMessages\.

Folder ACK Semantic files: GlobalConfig\HL7IncomingMessages\ Acknowledgments\.

Each received message must be assign to a message type.

The system supports 2 Message Types:

PatientMerge → enable with this entry DC.EVN.EventTypeCode(PatientMerge)

PatientReconciliation → enable with this entry DC.EVN.EventTypeCode(PatientMerge)

Yet another possibility is the message passing functionality. In this case the system creates an ACK for this message but do not generate an ActionTask entry.

One semantic file includes one message type. The link condition between the received message and the semantic file is defined in the [Condition] section in the semantic file and describe the content of all listed Message field and the expected content.



The [ActionTask] section define which information of the HL7 Message is necessary to generate a validate ActionsTask entry.

The [ACK_Files] section defines the ACK message content in separate semantic files. The content in the ACK files is defined like the semantic files for sending HL7 Messages (chapter 5).

It is possible to handle 4 different ACK cases:

IgnoreMessage → enable the message passing and generate an ACK like reference ACK semantic file.

NoLicense → if the requested functionality not licensed the system use this ACK File

Error → if occur an error send this ACK

Accept → define the ACK file for the normal case.

Information Transfer from HL7 Message to Action Task:

The field information from the HL7 Message must be transferred to the Action Task Service over a XML file. The content of this XML structure is defined in follow syntax

“DC.NodeName.ValueName”

The example semantic file has the following structure and includes an incoming A34 Patient Merge Message:

[Conditions]

EVN.1 = A34

[ActionTask]

ObjectUID = MRG.1

ObjectType = DicomPatientID

[ACK_Files]

;IgnoreMessage=HL7AckAccept.ini

NoLicense=HL7AckError.ini

Error=HL7AckError.ini

Accept=HL7AckAccept.ini

[Message]

MSH

EVN

PID



MRG

[MSH]

00 =
01 =
02 =
03 = DC.MSH.SendingApplication
04 = DC.MSH.SendingFacility
05 = DC.MSH.ReceivingApplication
06 = DC.MSH.ReceivingFacility
07 = DC.MSH.DateTime
08 =
09 = DC.MSH.MessageTypeAndEventType
10 = DC.MSH.MessageControlID
11 = DC.MSH.ProcessingId
12 = DC.MSH.Version
13 = DC.MSH.SequenceNumber(TomTecStuff)
14 =
15 =
16 = DC.MSH.ApplicationAcknowledgmentType
17 =
18 =
19 =
20 =

[EVN]

00 =
01 = DC.EVN.EventTypeCode(PatientMerge) ;EventTypeCode
02 = DC.EVN.RecordedDateTime ;RecordedDateTime
03 = ;DateTimePlannedEvent
04 = DC.EVN.EventReasonCode ;EventReasonCode
05 = DC.EVN.OperatorID ;OperatorID
06 = ;EventOccurred

[PID]

00 = ;PID
01 = DC.NewPatient.SetID ;SetID
02 = DC.NewPatient.DicomPatientId ;PatientID is DicomPatientID in IMProof
03 = DC.NewPatient.PatientIdentifierList ;PatientIdentifierList

04 = ;AlternatePatientID



05 = DC.NewPatient.FamilyName^DC.Patient.MiddleName^DC.Patient.GivenName^^DC.Patient.Prefix;PatientName

06 = DC.NewPatient.MotherMaidenName ;Mothers Maiden Name

07 = DC.NewPatient.DateOfBirth ;Dicom and HL7 are the same in this point! We can use the Dicom Format

08 = DC.NewPatient.Sex ;Dicom code can be used here!

09 = ;PatientAlias

10 = ;Race

11 = DC.NewPatient.PatientAddress ;Format: Str. 32^TTFulda^TTHessia^Te-36037^TE

12 = DC.NewPatient.CountryCode ;County Code is non-relevant for Europe except UK

13 = DC.NewPatient.PhoneNumberHome ;Phone Number Home

14 = ;Phone Number Business

15 = ;Primary Language

16 = DC.NewPatient.MartialStatus ;Marital Status

17 = DC.NewPatient.Religion ;Religion

18 = ;Patient Account Number

19 = ;SSN Number - Patient

20 = ;Driver's License Number - Patient

21 = ;Mother's Identifier

22 = ;Ethnic Group

23 = ;Birth Place

24 = ;Multiple Birth Indicator

25 = ;Birth Order

26 = DC.NewPatient.CitizenShip ;Citizenship

27 = ;Veterans Military Status

28 = ;Nationality

29 = ;Patient Death Date and Time

30 = ;Patient Death Indicator

[MRG]

00 = ;MRG

01 = DC.Patient.DicomPatientId ;SetID

02 =

7 HL7 segments

Below the most important HL7 segments are listed in detail. Nevertheless it is possible to add additional segments (e.g. Z segments) to the HL7 configuration.



MSH

Seq	HL7 Field Name
1	Field Separator
2	Encoding Characters
3	Sending Application
4	Sending Facility
5	Receiving Application
6	Receiving Facility
7	Date/time of Message
8	Security
9	Message Type
10	Message Control ID
11	Processing ID
12	Version ID
13	Sequence Number
14	Continuation Pointer
15	Accept Acknowledgement Type
16	Application Acknowledgement Type
17	Country Code
18	Character Set
19	Principal Language of Message

PID Segment

SEQ	HL7 Field Name
1	Set ID - patient ID
2	Patient ID (external ID)
3	Patient ID (internal ID)
4	Alternate patient ID
5	Patient name
6	Mother's maiden name
7	Date of birth
8	Sex
9	Patient alias
10	Race
11	Patient address
12	County code
13	Phone number - home
14	Phone number - business
15	Language - patient
16	Marital status
17	Religion
18	Patient account number
19	Social security number -
20	Driver's license number -
21	Mother's identifier
22	Ethnic group
23	Birth place
24	Multiple birth indicator
25	Birth order
26	Citizenship
27	Veterans military status



PV1 Segments

SEQ	HL7 Field Name
1	Set ID - patient visit
2	Patient class
3	Assigned patient location
4	Admission type
5	Preadmit number
6	Prior patient location
7	Attending doctor
8	Referring doctor
9	Consulting doctor
10	Hospital service
11	Temporary location
12	Preadmit test indicator
13	Readmission indicator
14	Admit source
15	Ambulatory status
16	VIP indicator
17	Admitting doctor
18	Patient type
19	Visit number
20	Financial class
21	Charge price indicator
22	Courtesy code
23	Credit rating
24	Contract code
25	Contract effective date
26	Contract amount
27	Contract period
28	Interest code
29	Transfer to bad debt - code
30	Transfer to bad debt - date
31	Bad debt agency code
32	Bad debt transfer amount
33	Bad debt recovery amount
34	Delete account indicator
35	Delete account date
36	Discharge disposition
37	Discharged to location
38	Diet type
39	Servicing facility
40	Bed status
41	Account status
42	Pending location
43	Prior temporary location
44	Admit date / time
45	Discharge date / time
46	Current patient balance
47	Total charges
48	Total adjustments
49	Total payments
50	Alternate visit ID



ORC Segments

SEQ	HL7 Field Name
1	Order control
2	Placer order number
3	Filler order number
4	Placer group number
5	Order status
6	Response flag
7	Quantity / timing
8	Parent
9	Date / time of transaction
10	Entered by
11	Verified by
12	Ordering provider
13	Enterer's location
14	Call back phone number
15	Order effective date / time
16	Order control code reason
17	Entering organization
18	Entering device
19	Action by

OBR Segments

SEQ	HL7 Field Name
1	Set ID - OBR
2	Placer Order Number
3	Filler Order Number +
4	Universal Service ID
5	Priority
6	Requested Date/time
7	Observation Date/Time #
8	Observation End Date/Time #
9	Collection Volume *
10	Collector Identifier *
11	Specimen Action Code *
12	Danger Code
13	Relevant Clinical Info.
14	Specimen Received Date/Time *
15	Specimen Source *
16	Ordering Provider
17	Order Callback Phone Number
18	Placer Field 1
19	Placer Field 2
20	Filler Field 1 +
21	Filler Field 2 +
22	Results Rpt/Status Chng - Date/Time +
23	Charge to Practice +
24	Diagnostic Serv Sect ID
25	Result Status +
26	Parent Result +
27	Quantity/Timing
28	Result Copies To
29	Parent *
30	Transportation Mode
31	Reason for Study
32	Principal Result Interpreter +
33	Assistant Result Interpreter +
34	Technician +
35	Transcriptionist +
36	Scheduled Date/Time +
37	Number of Sample Containers *
38	Transport Logistics of Collected Sample *
39	Collector's Comment *
40	Transport Arrangement Responsibility
41	Transport Arranged
42	Escort Required
43	Planned Patient Transport Comment



OBX segments

SEQ	HL7 Field Name
1	Set ID - OBX
2	Value Type
3	Observation Identifier
4	Observation Sub-ID
5	Observation Value
6	Units
7	References Range
8	Abnormal Flags
9	Probability
10	Nature of Abnormal Test
11	Observ Result Status
12	Date Last Obs Normal Values
13	User Defined Access Checks
14	Date/Time of the Observation
15	Producer's ID
16	Responsible Observer
17	Observation Method