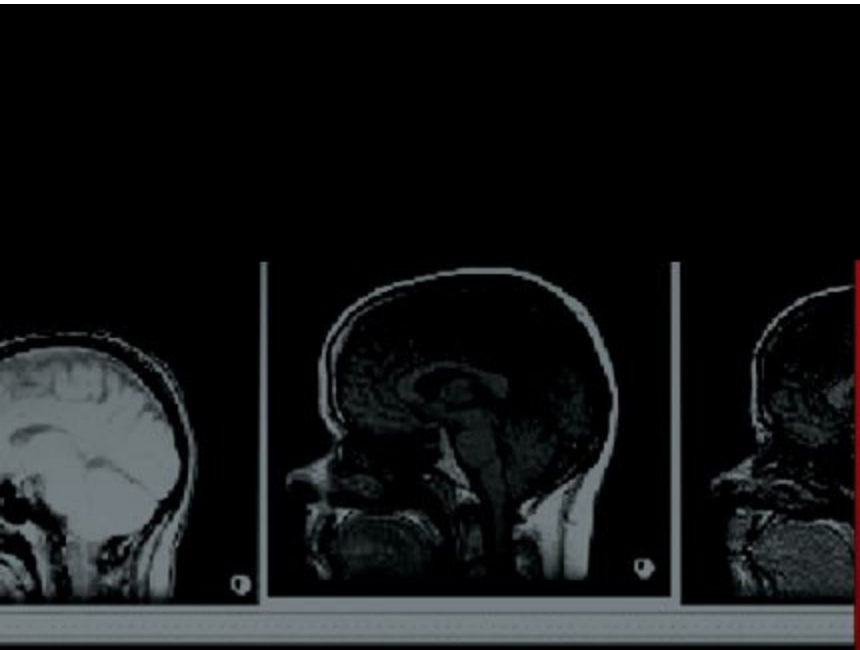

IntelePACS

3.7.1 and later
HL7 Integration Guide

Intelerad

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IntelePACS™ is a device that receives digital images and data from various sources (such as, CT scanners, MR scanners, ultrasound systems, R/F units, computer and direct radiographic devices, secondary capture devices, scanners, imaging gateways, or other imaging sources). Images and data can be communicated, processed, manipulated, enhanced, stored, and displayed within the system and/or across computer networks at distributed locations. Post-processing of the images can be performed using Multi Planar Reconstruction (MPR).

Mammographic images may only be interpreted using an FDA-cleared monitor that meets technical specifications reviewed and cleared by FDA.

Typical users of this system are trained professionals, physicians, nurses, and technicians.

CONTRAINDICATIONS—Lossy compressed images and digitized film screen images must not be reviewed for primary image interpretations.

Caution: Federal law restricts this device to sale by or on the order of a physician.

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DECLARATION OF CONFORMITY
We hereby certify that IntelePACS, a Class IIa Medical Device, is in compliance with Council Directive 93/42/EEC and marked with

CE 0086

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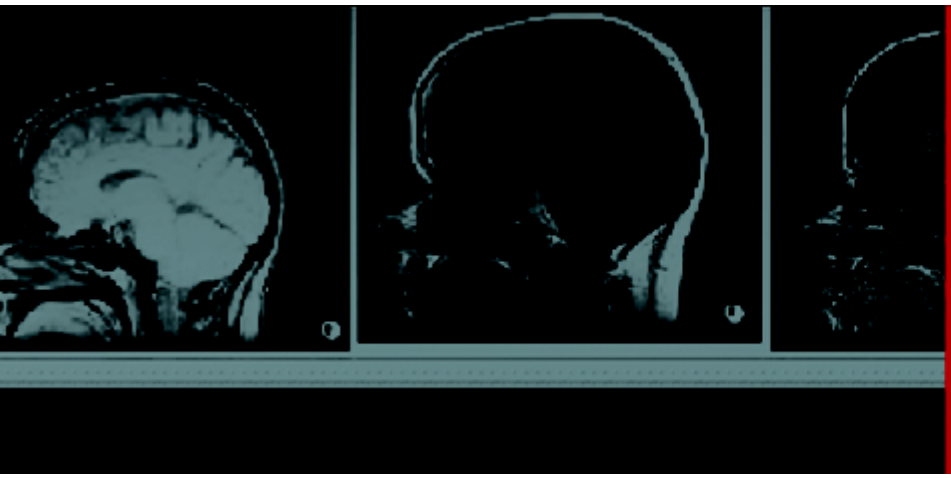
Title:	IntelePACS HL7 Integration Guide
Software version:	3.7.1 and later
Date:	April 13, 2017
Part number:	RISEN3711IG-O Issue 005



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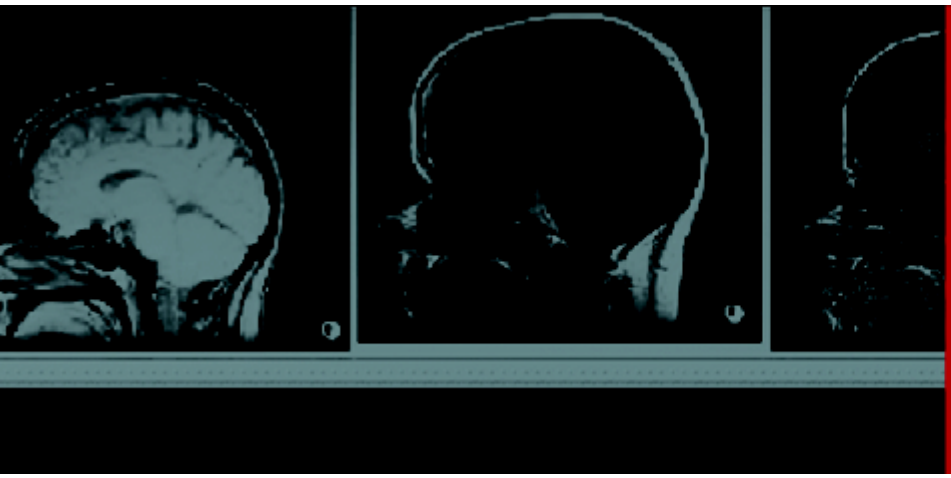

1 Getting Started

Many healthcare management systems use the Health Level Seven (HL7) standard to transfer patient information to other systems. This guide describes how to use HL7 to integrate your system with IntelePACS to manage radiological orders, procedures, and reports.

In this Chapter:

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About HL7 Integration with IntelePACS

As an HL7 integrator, you can use this guide to connect your system to IntelePACS. This chapter gives an overview of the concepts and terminology that the rest of this guide uses to describe how to integrate your system with IntelePACS.

Conforming to the IHE Technical Framework

Some of the data that your system sends to and receives from IntelePACS must follow extra requirements that the HL7 standard does not specify. IntelePACS expects these extra requirements because it conforms to the Integrating the Healthcare Enterprise (IHE) Technical Framework. This framework encourages interoperability among HL7 systems and Digital Imaging and Communications in Medicine (DICOM) systems.

For example, the HL7 standard specifies that field OBR-18 can contain arbitrary data (HL7 2.4, section 4.5.3.18). However, the IHE Technical Framework specifies that this HL7 field must contain the accession number for an order (IHE Technical Framework, vol. II: Transactions, Rev 6.0, Table 4.4-6).

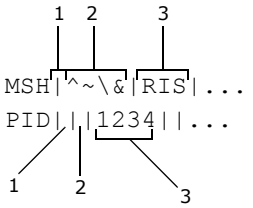
Interpreting HL7 Segments

The numbering scheme for fields in an HL7 message header (MSH) segment can cause confusion when compared with the numbering scheme for fields in other segments:

• For MSH segments, field 1 specifies the field separator character. Field 2 specifies encoding characters.

• For all other segments, field numbers start at 1.

Example of Field Numbering



In the MSH segment, field 1 must be the pipe character (“|”) and field 2 must be the caret, tilde, backslash, and ampersand characters (“^~\&”).

Specifying Patient Identifiers

A *patient identifier* (patient ID) uniquely identifies a patient within the hospital or radiology facility. A synonym for patient ID is *Medical Record Number* (MRN). For related information, see “Ensuring Unique Identifiers” on page 4.

A patient ID must meet these requirements:

• Be unique among all applications that send HL7 data to IntelePACS and all IntelePACS sites. Two or more patients cannot share the same patient ID.

• Contain a maximum of 20 characters including organization codes.

• Contain only alphanumeric, dash (-), dot (.), and underscore (_) characters. Other characters are not recommended.

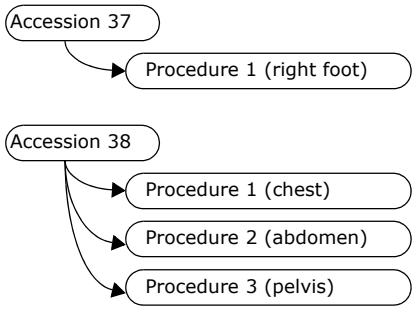
• Can be padded with leading or trailing spaces.

Note: If your system launches InteleViewer directly and your system uses lowercase letters in patient IDs, then please consult the Intelerad RIS Integration team. In this situation, InteleViewer might not be able to successfully display images for a patient.

Specifying Visit, Order, and Procedure Identifiers

An HL7 system identifies each radiological order by an *accession number*. Each order can have one or more procedures, each identified by a *requested procedure ID*.

Example of Orders and Procedures



Some HL7 systems associate a visit number with one or more orders. Intelerad recommends that your system not send visit numbers in HL7 data. If your system must send visit numbers to IntelePACS, ensure that they are consistently associated with the same accession numbers and patient IDs. For more information, see “Avoiding Order Binding Errors” on page 30.

Requirements for Accession Numbers

An accession number must meet these requirements:

• Be unique among all applications that send HL7 data to IntelePACS and all IntelePACS sites. See “Ensuring Unique Identifiers” on page 4.

• Contain a maximum of 16 characters including organization codes.

• Contain only alphanumeric, dash (-), dot (.), and underscore (_) characters. Other characters are not recommended.

• Can be padded with leading or trailing spaces.

Note: If your system uses lowercase letters in accession numbers, please consult the Intelerad RIS Integration team. If your system launches InteleViewer directly, then InteleViewer will not be able to display images for a patient when there are lowercase letters in the accession numbers that your system generates.

Requirements for Procedure IDs

A requested procedure ID must meet these requirements:

• Be unique among the procedures IDs in the order.

• Contain a maximum of 16 characters including organization codes.

• Contain only alphanumeric, dash (-), dot (.), and underscore (_) characters.

Ensuring Unique Identifiers

To make sure that identifiers are unique across all incoming HL7 feeds, IntelePACS or the sending application can add a suffix to any of these identifiers:

• patient ID

• accession number

• visit number

For example, a large radiological reading group uses IntelePACS to provide reading services to many third-party imaging facilities, each with its own RIS. The reading group must ensure that the identifiers from each of these imaging facilities are unique in the PACS. To achieve this requirement, each facility appends its own unique organization code to each of the identifiers that it sends to IntelePACS.

The need for adding a suffix to identifiers is determined by you (the HL7 integrator), the radiology client, and Intelerad at the start of an HL7 integration project.

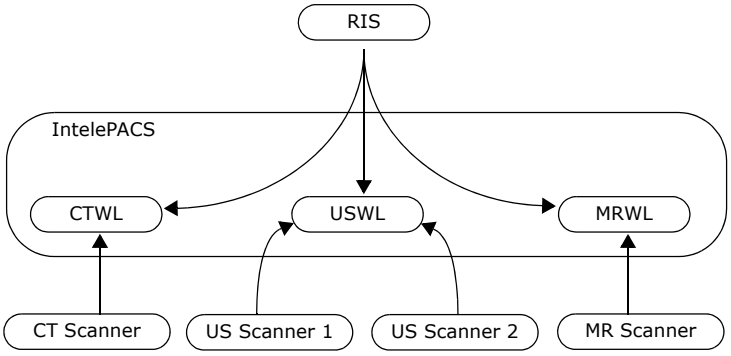
Working with DICOM Modality Worklists

IntelePACS can provide *DICOM Modality Worklists* (DMWLs). These worklists allow scanners to directly query IntelePACS for orders, freeing technologists/ radiographers from manually typing order information into a scanner console. By reducing typographical errors and time needed to prepare a scanner for a patient, DMWLs dramatically improve the efficiency of a radiology facility and ensure better patient safety.

Think of these worklists as buckets or bins that contain order information to be queried by one or more modalities, such as CR scanners and ultrasound machines. When your system schedules a procedure, it should specify which DMWL in IntelePACS should be populated with that procedure.

For example, in the diagram below, a RIS identifies which DMWL to fill by specifying a simple string within an HL7 message. With this information, IntelePACS fills a bin for one of its DMWLs. The scanners, in turn, are configured to query the appropriate DMWL in IntelePACS.

Example DMWLs in IntelePACS



For detailed information about how IntelePACS generates the DICOM data that is sent to modalities, see Appendix A, “HL7 Fields for Modality Worklists”.

Connecting to Intelerad’s HL7 Integration Test Server

It is always a good idea to start testing an integration right away. For example, there is often a risk that hardware is not available for a test system to be installed on-site until late in a project. To encourage you to test your integration early in the project, Intelerad offers a test server. This server is on the internet and is completely open for TCP

connections. For information on connecting to this server, contact your Intelerad RIS Integration Specialist.

Respect Patient Confidentiality

Do not send confidential patient information to this server! This connection is not encrypted, so always send anonymized test data only.

You should test your connectivity as early in the project as possible, well before your project begins sending HL7 messages.

To connect to the integration test server:

1. Open a web browser from your test environment and try connecting to:

   `https://<test hostname>`

   where <*test hostname*> is the name of the test server provided to you by Intelerad. If you see a login screen asking for a username and password, then you know you can reach this server.

2. At a command line, type:

   `telnet <test hostname> 5005`

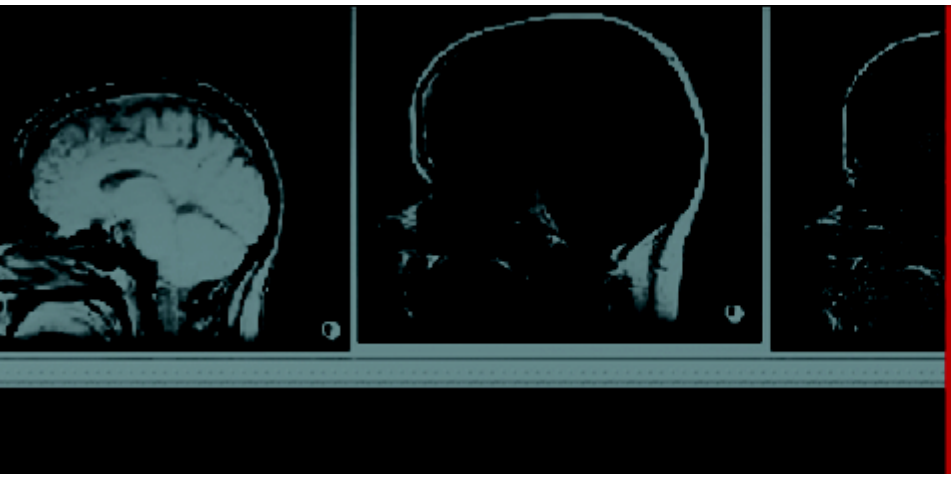
   A blank screen or no error indicates that you have successfully connected.

   If you cannot connect successfully, the telnet command will report this error:

   ```
   Could not open connection to the host, on port 5005:
   Connect failed
   ```

3. Close the command line.

   Note: If you encounter problems connecting to the test server, first verify the Intelerad host name, IP address, and port (5005) that you are using are correct. If the problem persists, a firewall or other network device might be impeding your connection to the Intelerad test server. Please contact your IT department to resolve this situation.



2 Sending Order Messages

Your system can send order information to IntelePACS with ORM messages. IntelePACS uses fields in these messages to manage the radiology workflow and validate the images that it stores.

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Intelerad

Scheduling a Procedure

Alerting IntelePACS that a procedure is scheduled is not required, but it is desirable.

IntelePACS can use the data in a scheduling message to configure RIS-driven prefetching of prior images. The more HL7 fields that your system supplies, the more precisely IntelePACS will be able to match its rules for prefetching studies, which improves the radiologist's workflow. For more information, see Appendix B, "HL7 Fields for RIS-Driven Prefetching".

Physical Trigger	Effect
The front desk schedules an order by entering it into a RIS.	Just before the scheduled time for the procedure, IntelePACS prefetches prior studies for the radiologist's convenience.

Below is an example of a scheduling message sent from an HL7 system to IntelePACS, with all required and recommended fields filled:

```
MSH|^~\&|RIS|BCREEK|INTELEPACS|Intelerad|20080124164827||ORM^O01|||2.3
PID|||1234||Brown^Roger^||19700203|M
PV1||||||||MHIBROY^Hibroy^M
ORC||885|885||SC
OBR||885|885|MRWL^SPINE||200710191649|||||||||||885|1|1||||CR
```

If your system is unable to assign an accession number to a study at the time of scheduling, your system can send an SIU (scheduling message) instead of an ORM^O01 message. Note that an SIU message provides less useful information for the IntelePACS RIS-prefetching service. For more information, see "HL7 Fields for RIS-Driven Prefetching" on page 52.

The following table lists the required (R) and optional (O) fields for ORM^O01 scheduling messages. Fields marked with an asterisk (*) might be required depending on the IntelePACS workflow. For detailed information, see "Descriptions of Fields for Order Messages" on page 14.

Seg	Field	Length	Opt	Definition
MSH	3	180	R	Name of your sending application.
	4	180	R	Name of the sending facility.
	5	180	R	Name of receiving application (INTELEPACS).
	6	180	R	Name of receiving facility (Intelerad).
	9	15	R	Message type (ORM^O01).
PID	3	20	R	Patient ID/MRN.
	5	64	R	Patient Name.
	7	26	R	Patient Date of Birth (*YYYYMMDD*).
	8	1	R	Patient Sex (M, F, O, or *blank*).

Seg	Field	Length	Opt	Definition
PV1	8	60	*	Referring Physician.
	19	20	O	Visit Number. Should be suppressed in most cases. See “Avoiding Order Binding Errors” on page 30.
ORC	2	16	R	Placer Order Number. Can be the accession number.
	3	16	R	Filler Order Number. Can be the accession number.
	5	2	R	Order Status (SC).
	17	8	O	Entering Organization.
OBR	2	16	R	Placer Order Number. Can be the accession number.
	3	16	R	Filler Order Number. Can be the accession number.
	4.1	185 to 248	*	DICOM Modality Worklists.
	4.2	64	O	Study Description.
	6	26	R	Requested Date/Time (*YYYYMMDDhhmm*).
	7	26	O	Observation Date/Time (*YYYYMMDDhhmm*).
	13	16K	O	Relevant Clinical Information.
	16	60	*	Ordering Provider.
	18	16	R	Accession Number.
	19	16	R	Requested Procedure ID.
	20	16	R	Scheduled Step ID (1).
	24	2	R	Modality.
	31	250	O	Reason for Study.
	44	16	O	Procedure Code (DICOM CodeValue).
ZDS	1	64	*	Study Instance UID.

Marking a Patient as Arrived

IntelePACS *must* be alerted when the patient arrives and is about to be scanned, or as close to that event as possible. With this information IntelePACS can fill the appropriate DICOM Modality Worklist (DMWL) with relevant patient demographics and the requested procedure name.

Physical Trigger	Effect
The front desk enters information in the RIS about the arrival of the patient.	IntelePACS fills the appropriate modality worklist bins with the orders for the patient.

Below is an example of an arrival message with the required fields filled:

```
MSH|^~\&|RIS|BCREEK|INTELEPACS|Intelerad|20080124164827||ORM^O01|||2.3
PID|||1234||Brown^Roger^||19700203|M
PV1||||||||MHIBROY^Hibroy^M
ORC||885|885||IP
OBR||885|885|MRWL^NECK||200710191645|200710191700||||||||||885|1|1||||CR
```

The following table lists the required (R) and optional (O) fields for patient arrival messages. Fields marked with an asterisk (*) are recommended depending on the IntelePACS workflow. For detailed information, see “Descriptions of Fields for Order Messages” on page 14.

Seg	Field	Length	Opt	Definition
MSH	3	180	R	Name of your sending application.
	4	180	R	Name of your sending facility.
	5	180	R	Name of receiving application (INTELEPACS).
	6	180	R	Name of receiving facility (Intelerad).
	9	15	R	Message type (ORM^O01).
PID	3	20	R	Patient ID/MRN.
	5	64	R	Patient Name.
	7	26	R	Patient Date of Birth (*YYYYMMDD*).
	8	1	R	Patient Sex (M, F, O, or *blank*).
PV1	8	60	*	Referring Physician.
	19	20	O	Visit Number. Should be suppressed in most cases. See “Avoiding Order Binding Errors” on page 30.
ORC	2	16	R	Placer Order Number. Can be the accession number.
	3	16	R	Filler Order Number. Can be the accession number.
	5	2	R	Order Status (IP).
	17	8	O	Entering Organization.

Seg	Field	Length	Opt	Definition
OBR	2	16	R	Placer Order Number. Can be the accession number.
	3	16	R	Filler Order Number. Can be the accession number.
	4.1	185 to 248	*	DICOM Modality Worklists.
	4.2	64	R	Study Description.
	6	26	R	Requested Date/Time (*YYYYMMDDhhmm*).
	7	26	R	Observation Date/Time (*YYYYMMDDhhmm*).
	13	16K	O	Relevant Clinical Information.
	16	60	*	Ordering Provider.
	18	16	R	Accession Number.
	19	16	R	Requested Procedure ID.
	20	16	R	Scheduled Step ID (1).
	24	2	R	Modality.
	31	250	O	Reason for Study.
	44	16	O	Procedure Code (DICOM CodeValue).
ZDS	1	64	*	Study Instance UID.

Marking a Procedure as Finished

Your system sends a completion message to IntelePACS to communicate that the technologist/radiographer has completed a procedure.

Physical Trigger	Effect
Technologist/radiographer finishes taking images.	IntelePACS removes the order from the modality worklist and inserts it into the radiologist's worklist.

Below is an example of a procedure completion message with all required and recommended fields filled:

```
MSH|^~\&|RIS|BCREEK|INTELEPACS|Intelerad|20080124164827||ORM^O01|||2.3
PID|||1234||Brown^Roger^||19700203|M
PV1||||||||MHIBROY^Hibroy^M
ORC||885|885||CM
OBR||885|885|||||200710191723||||||||||885|1|1||||CR
```

The following table lists the required (R) and optional (O) fields for ORM^O01 procedure completion messages. Fields marked with an asterisk (*) might be required,

depending on IntelePACS workflow. For detailed information, see “Descriptions of Fields for Order Messages” on page 14.

Seg	Field	Length	Opt	Definition
MSH	3	180	R	Name of your sending application.
	4	180	R	Name of your sending facility.
	5	180	R	Name of receiving application (INTELEPACS).
	6	180	R	Name of receiving facility (Intelerad).
	9	15	R	Message type (ORM^O01).
PID	3	20	R	Patient ID/MRN.
	5	64	R	Patient Name.
	7	26	R	Patient Date of Birth (*YYYYMMDD*).
	8	1	R	Patient Sex (M, F, O, or *blank*).
PV1	8	60	*	Referring Physician.
	19	20	O	Visit Number. Should be suppressed in most cases. See “Avoiding Order Binding Errors” on page 30.
ORC	2	16	R	Placer Order Number. Can be the accession number.
	3	16	R	Filler Order Number. Can be the accession number.
	5	2	R	Order Status (CM).
	17	8	O	Entering Organization.
OBR	2	16	R	Placer Order Number. Can be the accession number.
	3	16	R	Filler Order Number. Can be the accession number.
	4.1	185 to 248	*	DICOM Modality Worklists.
	4.2	64	R	Study Description.
	6	26	R	Requested Date/Time (*YYYYMMDDhhmm*).
	7	26	R	Observation Date/Time (*YYYYMMDDhhmm*).
	8	26	O	Observation End Date/Time (*YYYYMMDDhhmm*).
	13	16K	O	Relevant Clinical Information.
	16	60	*	Ordering Provider.
	18	16	R	Accession Number.
	19	16	R	Requested Procedure ID.
	20	16	R	Scheduled Step ID (1).
	24	2	R	Modality.
	31	250	O	Reason for Study.
	32	200	*	Principal Result Interpreter.
	34	200	*	Technician.
	44	16	O	Procedure Code (DICOM CodeValue).

Seg	Field	Length	Opt	Definition
ZDS	1	64	*	Study Instance UID.

Cancelling a Procedure

Your system can alert IntelePACS that a procedure has been cancelled by sending a cancellation message.

Physical Trigger	Effect
Although there are many reasons for triggering this event, the most common is that the patient cancels an appointment.	IntelePACS sets the order to a special status, "CA." IntelePACS also removes the order from modality worklists and hides related reports from InteleViewer and IntelePACS Browser.

Note: Your system must not re-use the accession numbers of cancelled orders for new orders. Cancelling an order in IntelePACS is not the same as deleting an order. Cancelling only marks the status of the cancelled order with the special value "CA".

Below is an example of a cancellation message with all required and recommended fields filled:

```
MSH|^~\&|RIS|BCREEK|INTELEPACS|Intelerad|20080124164827||ORM^O01|||2.3
PID|||1234||Brown^Roger^||19700203|M
PV1||||||||MHIBROY^Hibroy^M
ORC||885|885||CA
OBR||885|885|||||||||||||885|1|1
```

The following table lists the required (R) and optional (O) fields for cancellation messages. Fields marked with an asterisk (*) might be required, depending on the IntelePACS workflow. For detailed information, see "Descriptions of Fields for Order Messages" on page 14.

Seg	Field	Length	Opt	Definition
MSH	3	180	R	Name of your sending application.
	4	180	R	Name of your sending facility.
	5	180	R	Name of receiving application (INTELEPACS).
	6	180	R	Name of receiving facility (Intelerad).
	9	15	R	Message type (ORM^O01).
PID	3	20	R	Patient ID/MRN.
	5	64	R	Patient Name.
	7	26	R	Patient Date of Birth (*YYYYMMDD*).
	8	1	R	Patient Sex (M, F, O, or *blank*).

Seg	Field	Length	Opt	Definition
PV1	8	60	*	Referring Physician.
	19	20	O	Visit Number. Should be suppressed in most cases. See “Avoiding Order Binding Errors” on page 30.
ORC	2	16	R	Placer Order Number. Can be the accession number.
	3	16	R	Filler Order Number. Can be the accession number.
	5	2	R	Order Status (CA).
OBR	2	16	R	Placer Order Number. Can be the accession number.
	3	16	R	Filler Order Number. Can be the accession number.
	16	60	*	Ordering Provider.
	18	16	R	Accession Number.
	19	16	R	Requested Procedure ID.
	20	16	R	Scheduled Step ID (1).

Descriptions of Fields for Order Messages

This section describes some of the fields in order messages.

Patient ID (PID-3)

IntelePACS only accepts the first field component, PID-3.1, for the patient ID. Only one patient ID may be specified in this component.

Referring Physician (PV1-8)

IntelePACS uses referring physician information in several ways:

• Displays it in the InteleViewer Report Viewer, the IntelePACS Browser Report Viewer, and the Reporting Worklist.

• Triggers rules for RIS-driven prefetching.

• Grants access to studies through auto-linking.

• Automatically sends reports to referring physicians through the Report Distribution Module.

Field Component	Name	Definition/Details
PV1-8.1	Referring Physician ID	A unique ID from your system for the referring physician. This ID must match the RIS ID configured in the IntelePACS user account for this physician.
PV1-8.2 - 8.4	Referring Physician Name	*LAST^FIRST^MIDDLE*

Note: If this field is empty, IntelePACS will use Ordering Provider (OBR-16) for the referring physician information.

Entering Organization (ORC-17)

Entering Organization is a code for uniquely identifying the department or group to which an order or report belongs. IntelePACS uses this information to restrict access to patient information, for differentiating items in the Reporting Worklist, and for RIS-driven prefetching.

Examples:

• A radiology practice offers its services to several clients, with each client using a unique organization code. The PACS administrator can configure the PACS so that the users from each client may only see the reports for their own orders.

• A radiologist can sort and filter studies in the Reporting Worklist to read studies for specific organizations.

• A PACS administrator can configure the IntelePACS to prefetch studies for a department's orders that meet the clinical or regulatory requirements that this department specifies.

Note: This field is required when the IntelePACS is configured for site code restrictions. Orders and reports without this field are not accessible by users.

DICOM Modality Worklist Bin (OBR-4.1)

IntelePACS uses this data for filling DICOM Modality Worklists (DMWL) and for RIS-prefetching. For more information see "Working with DICOM Modality Worklists" on page 5.

The maximum length for a DMWL name is 16 characters. Your HL7 system may specify more than one DWML specifying them as separate subcomponents. For example: `Worklist1&Worklist2&Worklist3`. The total maximum length of OBR-4 is 250 characters.

If your HL7 provides its own DMWL, then this component can be left blank but your system is required to provide a ZDS segment.

Study Description (OBR-4.2)

IntelePACS presents the second component of the Universal Service ID (OBR-4) as text to end users for the principal description for the study.

The maximum length for this component is 64 characters. The total maximum length of all components in the OBR-4 field is 250 characters.

Observation End Date/Time (OBR-8)

The date and time that the technologist completes the imaging. If this field is not supplied by the RIS, the IntelePACS server will use its own current date and time to supply this information.

Relevant Clinical Information (OBR-13)

IntelePACS appends the contents of this field to the contents of the Reason for Study (OBR-31) field. The InteleViewer Report Viewer and the patient history panel of the To Read tab of the Reporting Worklist window present this combined text to the end user.

Ordering Provider (OBR-16)

When a message does not specify Referring Physician (PV1-8), IntelePACS uses the ordering provider information to specify the referring physician.

Note: If a message specifies PV1-8, the IntelePACS ignores the OBR-16 field.

Field Component	Name	Definition/Details
OBR-16.1	Ordering Provider ID	A unique ID from your system. This ID must match the RIS ID configured in the IntelePACS user account for this physician.
OBR-16.2 - 16.4	Ordering Provider Name	*LAST^FIRST^MIDDLE*

Procedure ID (OBR-19)

If orders from your system can have multiple procedures, then your system must provide a unique ID for each procedure in the order. If your system only associates one procedure to each order, then you can set this field to 1.

For more information, see “Specifying Visit, Order, and Procedure Identifiers” on page 3.

Modality (OBR-24)

Scanners can use the following 2-letter codes when querying IntelePACS for their worklists.

DICOM Modality Code	Code Description
AS	Angioscopy
CR	Computed Radiography
CS	Cystoscopy
CT	Computed Tomography
DM	Digital Microscopy
DR	Digital Radiography
EC	Echocardiography
ES	Endoscopy
FS	Fundoscopy
LP	Laparoscopy
MG	Mammography
MR	Magnetic Resonance
NM	Nuclear Medicine
OT	Other
PT	Positron Emission Tomography
RF	Radio Fluoroscopy
TG	Thermography
US	Ultrasound
XA	X-Ray Angiography

Reason for Study (OBR-31)

IntelePACS prepends the contents of this field to the beginning of the contents of the Relevant Clinical Information (OBR-13) field. InteleViewer and Reporting Worklist present this combined text to the end user.

Principal Result Interpreter (OBR-32)

In workflows where radiologists use your system to dictate reports, your system must provide identifying information about the reporting radiologist and the time of dictation. In workflows that use the Reporting Worklist from Intelerad, leave this field blank.

Field Component	Name	Definition/Details
OBR-32.1	Radiologist ID	A unique ID from your system for the radiologist. This ID must match the RIS ID configured in the IntelePACS user account for this radiologist.

Field Component	Name	Definition/Details
OBR-32.2 - 32.4	Radiologist Name	*LAST^FIRST^MIDDLE*
OBR-32.6	Dictation Date/Time	*YYYYMMDDhhmm*

Technician (OBR-34)

In IntelePACS workflows with the Image Quality Review Module, your system must provide identifying information about the technologist/radiographer and the starting time of the procedure. IntelePACS uses this information to associate technical reviews of images from radiologists with the technologist/radiographer who took the images.

Field Component	Name	Definition/Details
OBR-34.1.1	ID	A unique ID from your system for the technologist/radiographer. This ID must match the RIS ID configured in the IntelePACS user account for this technologist/radiographer.
OBR-34.1.2 - 34.1.4	Name	*LAST&FIRST&MIDDLE*
OBR-34.2	Date/Time	*YYYYMMDDhhmm*

For example:

```
VSMITH&Smitch&Valentine&Michael^20090612140317
```

Procedure Code (OBR-44)

The scanner, typically a CR or DR modality, translates a procedure code to a sequence of mouse clicks, keyboard strokes, or button presses for the scanner's console. These operations would otherwise be performed manually by the technologist/radiographer.

IntelePACS passes this code from your system to the scanner via the DICOM Modality Worklist. For more information on the format of this code, see the documentation from the manufacturer of the scanner.

Study Instance UID (ZDS)

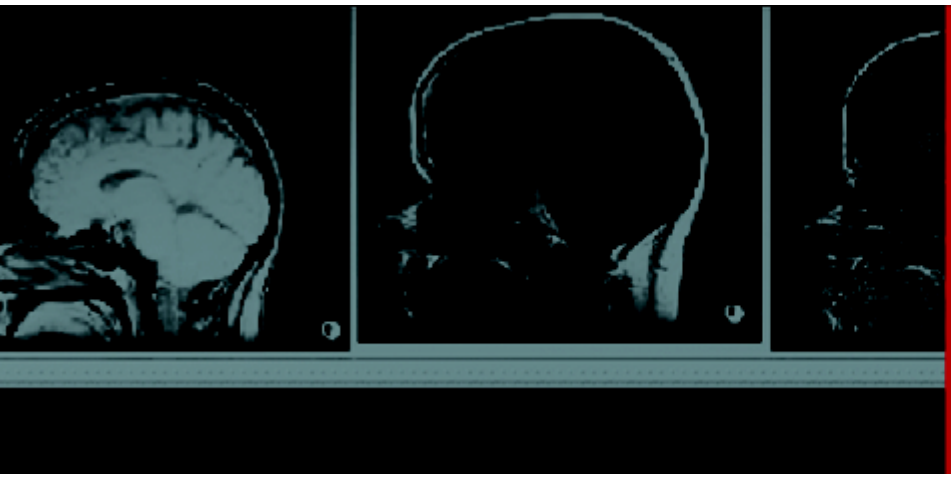
When your system, typically a RIS, provides the DICOM Modality Worklist (DMWL), your RIS must provide the ZDS segment. Make sure that the study instance UID that your RIS provides to the modality is the same as the study instance UID that it provides to IntelePACS. If this segment is missing, or the study instance UIDs that the modality and IntelePACS receive are not consistent, then the images might not pass validation in IntelePACS.

If your RIS can assign more than one procedure to an order, then your RIS must provide a unique study instance UID for each procedure in an order.

If your RIS does not provide a DMWL, this segment is optional.

Below is an example of a ZDS segment:

```
ZDS|1.2.840.113619.2.55.3.1973400610.6285.1193307214.115
^^Application^DICOM
```



3 Sending Reports to IntelePACS

Your system can send inbound report and addendum information to IntelePACS with ORU messages.

In this Chapter:

Sending a Report 21
Sending an Addendum or Correction 22
Sending and Migrating Historical Reports 23
Descriptions of Fields for Report Messages 23

Intelerad

Sending a Report

A report message informs IntelePACS of a report for an existing order.

Physical Trigger	Effect
Report is dictated, transcribed, then signed.	IntelePACS displays report text in the report viewers in InteleViewer and IntelePACS Browser.

Below is an example of a report message with all required fields filled:

```
MSH|^~\&|RIS|BCREEK|INTELEPACS|Intelerad|20080124164827||ORU^R01|||2.3
PID|||1234||Brown^Roger^||19700203|M
PV1||||||||MHIBROY^Hibroy^M
ORC||885|885||ZZ
OBR||885|885|||||||||||||||885|1|1|||||||||||||48^Doe^John^^^20090116174405|
||52^Lee^Hugh^^^20090117083405
OBX|||||Original report.||||||F
```

The following table lists the required (R) and optional (O) fields for report and addendum messages. Fields marked with an asterisk (*) might be required, depending on the IntelePACS workflow. For detailed explanations of the fields for addenda, see “Descriptions of Fields for Report Messages” on page 23.

Seg	Field	Length	Opt	Definition
MSH	3	180	R	Name of your sending application.
	4	180	R	Name of your sending facility.
	5	180	R	Name of receiving application (INTELEPACS).
	6	180	R	Name of receiving facility (Intelerad).
	9	15	R	Message type (ORU^R01).
PID	3	20	R	Patient ID/MRN.
	5	64	R	Patient Name.
	7	26	R	Patient Date of Birth (*YYYYMMDD*).
	8	1	R	Patient Sex (M, F, O, or *blank*).
PV1	8	60	*	Referring Physician.
ORC	2	16	R	Placer Order Number. Can be the accession number.
	3	16	R	Filler Order Number. Can be the accession number.
	5	2	R	Order Status (ZZ for final reports and ZY for preliminary reports. In most cases only final reports are sent to IntelePACS.)
	17	8	O	Entering Organization.

Seg	Field	Length	Opt	Definition
OBR	2	16	R	Placer Order Number. Can be the accession number.
	3	16	R	Filler Order Number. Can be the accession number.
	13	16K	O	Relevant Clinical Information.
	16	60	*	Ordering Provider.
	18	16	R	Accession Number.
	19	16	R	Requested Procedure ID.
	20	16	R	Scheduled Step ID (1).
	31	250	O	Reason for Study.
	32	200	R	Principal Result Interpreter.
	35	200	R	Transcriptionist.
OBX	5	64K	R	Observation Value.
	11	1	R	Result status.

Sending an Addendum or Correction

Your system sends a report message to inform IntelePACS of an addendum or correction to an existing report for an existing order. The format for an addendum or correction message is identical to a report message. For more information, see "Sending a Report" on page 21.

Note: When your system sends an addendum or correction message to IntelePACS, your system must include the original report, all prior addenda, and all prior corrections. When IntelePACS receives a report message, it overwrites its own report information with the new information.

Physical Trigger	Effect
Report addendum or correction is finalized.	IntelePACS displays report text in the report viewers in the InteleViewer and IntelePACS Browser.

For detailed explanations of the fields for addenda, see "Descriptions of Fields for Report Messages" on page 23.

Below is an example of an addendum message with all required fields filled:

```
MSH|^~\&|RIS|BCREEK|INTELEPACS|Intelerad|20080124164827||ORU^R01|||2.3
PID|||1234||Brown^Roger^||19700203|M
PV1||||||||MHIBROY^Hibroy^M
ORC||885|885||ZZ
OBR||885|885|||||||||||||||885|1|1|||||||||||48^Doe^John^^^200901161744|||
52^Lee^Hugh^^^200901170834
OBX|||||This is an addendum<br>Original report.||||||F
```

Sending and Migrating Historical Reports

If your system will be sending historical reports to IntelePACS, these will be the first, and possibly only, HL7 records for prior exams. To ensure that IntelePACS can correctly associate these reports to prior exams, it is important that your HL7 system provides all of the fields that would normally be sent at different stages of an order's life cycle.

When historical reports are presented to a user in a patient's list of prior exams, these fields are used to provide a brief overview of the study. It is particularly important to send this information:

• Patient identification information in PID-3, PID-5, PID-7, and PID-8.

• Entering organization code in ORC-17.

• Study description in OBR-4.2

• Relevant study dates in OBR-6, OBR-7 and OBR-8. If you have only one timestamp for the study, you can replicate it in OBR-6, OBR-7 and OBR-8.

• Accession number in OBR-18.

• Modality code in OBR-24.

• If you have information for the referring physician that should also be included in PV1-8 or OBR-16.

Below is an example of a prior report with all of the required fields filled:

```
MSH|^~\&|RIS|BCREEK|INTELEPACS|Intelerad|20080124164827||ORU^R01|||2.3
PID|||1234||Brown^Roger^||19700203|M
PV1||||||||MHIBROY^Hibroy^M
ORC||885|885||ZZ||||||||||||BCR
OBR||885|885|MRWL^NECK||200710191645|200710191700|200710191700|||||||||885
|1|1||||CR||||||||48^Doe^John^ ^^200901161744|||52^Lee^Hugh^^^200901170834
OBX|||||This is an historical report.||||||F
```

Descriptions of Fields for Report Messages

This section describes some of the fields in report messages.

Patient ID (PID-3)

IntelePACS only accepts the first field component, PID-3.1, for the patient ID. Only one patient ID may be specified in this component.

Referring Physician (PV1-8)

IntelePACS uses referring physician information in several ways:

• Displays it in the InteleViewer Report Viewer, the IntelePACS Browser Report Viewer, and the Reporting Worklist.

• Triggers rules for RIS-driven prefetching.

• Grants access to studies through auto-linking.

• Automatically sends reports to referring physicians through the Report Distribution Module.

Field Component	Name	Definition/Details
PV1-8.1	Referring Physician ID	A unique ID from your system for the referring physician. This ID must match the RIS ID configured in the IntelePACS user account for this physician.
PV1-8.2 - 8.4	Referring Physician Name	*LAST^FIRST^MIDDLE*

Note: If this field is empty, IntelePACS will use Ordering Provider (OBR-16) for the referring physician information.

Entering Organization (ORC-17)

Entering Organization is a code for uniquely identifying the department or group to which an order or report belongs. IntelePACS uses this information to restrict access to patient information, for differentiating items in the Reporting Worklist, and for RIS-driven prefetching.

Examples:

• A radiology practice offers its services to several clients, with each client using a unique organization code. The PACS administrator can configure the PACS so that the users from each client may only see the reports for their own orders.

• A radiologist can sort and filter studies in the Reporting Worklist to read studies for specific organizations.

• A PACS administrator can configure the IntelePACS to prefetch studies for a department's orders that meet the clinical or regulatory requirements that this department specifies.

Note: This field is required when the IntelePACS is configured for site code restrictions. Orders and reports without this field are not accessible by users.

Relevant Clinical Information (OBR-13)

IntelePACS appends the contents of this field to the contents of the Reason for Study (OBR-31) field. The InteleViewer Report Viewer and the patient history panel of the To Read tab of the Reporting Worklist window present this combined text to the end user.

Ordering Provider (OBR-16)

When a message does not specify Referring Physician (PV1-8), IntelePACS uses the ordering provider information to specify the referring physician.

Note: If a message specifies PV1-8, the IntelePACS ignores the OBR-16 field.

Field Component	Name	Definition/Details
OBR-16.1	Ordering Provider ID	A unique ID from your system. This ID must match the RIS ID configured in the IntelePACS user account for this physician.
OBR-16.2 - 16.4	Ordering Provider Name	*LAST^FIRST^MIDDLE*

Procedure ID (OBR-19)

If orders from your system can have multiple procedures, then your system must provide a unique ID for each procedure in the order. If your system only associates one procedure to each order, then you can set this field to 1.

For more information, see “Specifying Visit, Order, and Procedure Identifiers” on page 3.

Reason for Study (OBR-31)

IntelePACS prepends the contents of this field to the beginning of the contents of the Relevant Clinical Information (OBR-13) field. InteleViewer and Reporting Worklist present this combined text to the end user.

Principal Result Interpreter (OBR-32)

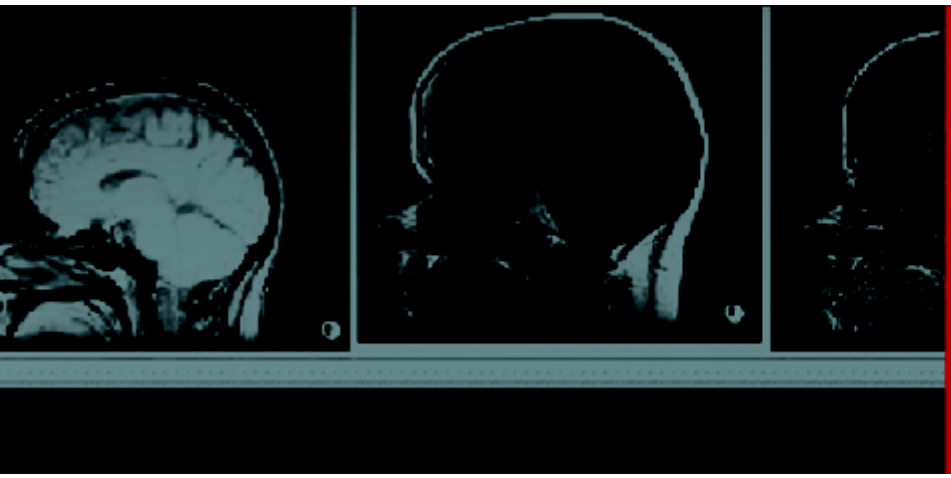
In workflows where radiologists use your system to dictate reports, your system must provide identifying information about the reporting radiologist and the time of dictation. In workflows that use the Reporting Worklist from Intelerad, leave this field blank.

Field Component	Name	Definition/Details
OBR-32.1	Radiologist ID	A unique ID from your system for the radiologist. This ID must match the RIS ID configured in the IntelePACS user account for this radiologist.
OBR-32.2 - 32.4	Radiologist Name	*LAST^FIRST^MIDDLE*
OBR-32.6	Dictation Date/Time	*YYYYMMDDhhmm*

Transcriptionist (OBR-35)

In workflows where transcriptionists use the RIS to transcribe reports, the RIS must provide identifying information about the transcriptionist and the time of transcription. In workflows that use the Transcription Module from Intelerad, leave this field blank.

Field component	Name	Definition/Details
OBR-35.1	Transcriptionist ID	A unique ID from your system for the transcriptionist. This ID must match the RIS ID configured in the IntelePACS user account for this transcriptionist.
OBR-35.2 - 35.4	Transcriptionist Name	*LAST^FIRST^MIDDLE*
OBR-35.6	Transcription Date/Time	*YYYYMMDDhhmm*



4 Sending Administration Messages

Your system can send patient update and patient merge information to IntelePACS with ADT messages.

In this Chapter:

Updating Patient Demographics 28
Merging Patient Demographics 28
Accepted ADT Events 31

Intelerad

Updating Patient Demographics

Your system sends a patient update message to synchronize patient data in your system with the patient and image data in IntelePACS.

Note: Update messages are important and necessary to keep patient data consistent between your system and IntelePACS.

Physical Trigger	Effect
A patient informs the front desk staff of an error in her family name, date of birth, or sex.	IntelePACS updates all studies belonging to that patient.

Below is an example of a patient update message:

```
MSH|^~\&|RIS|BCREEK|INTELEPACS|Intelerad|20080110164521||ADT^A08|||2.3
PID|||1234||Brown^Roger^||19700512|M
```

The following table lists the required (R) and optional (O) fields for a demographic update message. This message must contain at least one of the PID-5, PID-7, or PID-8 fields, which are marked with an asterisk (*).

Seg	Field	Len	Opt	Definition
MSH	3	180	R	Name of your sending application
	4	180	R	Name of your sending facility
	5	180	R	Name of receiving application (INTELEPACS)
	6	180	R	Name of receiving facility (Intelerad)
	9	15	R	Message type. See “Accepted ADT Events” on page 31.
PID	3	20	R	Patient ID/MRN
	5	64	*	Updated Patient Name
	7	26	*	Updated Patient Date of Birth (*YYYYMMDD*)
	8	1	*	Updated Patient Sex (M, F, O, or *blank*)

Patient ID (PID-3)

IntelePACS only accepts the first field component, PID-3.1, for the patient ID. Only one patient ID may be specified in this component.

Merging Patient Demographics

Your system sends a merge message to instruct IntelePACS to move the studies for one patient to another patient.

Warning: For every patient merge operation that your system performs on its own data, it must also send a corresponding patient merge message to IntelePACS.

After sending a merge message, your system should make sure that it receives an acknowledgement message from IntelePACS and that this acknowledgement confirms a successful merge operation.

Physical Trigger	Effect
The front desk staff assigns a new MRN to an existing patient. Later, the front desk staff discovers that the patient already has studies in IntelePACS under a different MRN.	IntelePACS moves and updates all studies from a source patient to destination patient. IntelePACS deletes all demographic data for the source patient.

Note: A patient merge operation cannot be undone.

The only links between HL7 orders in your system and images in IntelePACS are the accession number (OBR-18) and MRN (PID-3). It is therefore crucial that the accession numbers and MRNs associated with images in the IntelePACS database always match the same identifiers in your system's database.

For example, these tasks depend on consistent data between your system and IntelePACS:

• A referring physician can use your system to view images by launching InteleViewer directly.

• IntelePACS can retrieve prior studies for viewing by a radiologist.

• Your system can attach reports to images that are stored in IntelePACS.

Upon receiving any ORM or ORU message, IntelePACS will check its database to ensure that the MRN number in the message is consistent with messages that your system has previously sent for the same accession number. If IntelePACS finds a mismatch, it will reject the message to avoid the possibility of erroneously attaching a procedure or report to the wrong patient, which could affect patient safety.

The only acceptable manner to change the MRN that is bound to orders is to send a patient merge message to IntelePACS. This is an explicit request for IntelePACS to bind all orders for a source MRN to the destination MRN. All subsequent ORM and ORU messages that your system sends to IntelePACS for this patient will always contain the destination MRN.

Below is an example of a patient merge message:

```
MSH|^~\&|RIS|BCREEK|INTELEPACS|Intelerad|20080124164827||ADT^A18|||2.3
PID|||3322
MRG|3344
```

When IntelePACS receives this message, it moves and updates all studies for the patient with MRN 3344 to the patient with MRN 3322. IntelePACS then deletes demographics data for MRN 3344.

These fields are required to merge patient data:

Seg	Field	Length	Opt	Definition
MSH	3	180	R	Name of your sending application
	4	180	R	Name of your sending facility
	5	180	R	Name of receiving application (INTELEPACS)
	6	180	R	Name of receiving facility (Intelerad)
	9	15	R	Message type (ADT^A18)
PID	3	20	R	Destination Patient ID/MRN
MRG	1	20	R	Source Patient ID/MRN

Avoiding Order Binding Errors

The word *binding* comes from the notion that a single patient is *bound* to a visit or accession number and that an accession number is *bound* to a single visit. The PACS performs integrity tests to ensure that the data within the message received from your HL7 system is consistent with the data in the IntelePACS before committing an update to an order in the IntelePACS. This is especially important for reports where errors could potentially affect diagnosis and possibly patient safety.

The PACS verifies that the following conditions are satisfied:

• For any given accession number (OBR-18) there can be only one patient (PID-3).

• There must be only one Patient ID (PID-3) associated with a Visit Number (PV1-19).

• An accession number (OBR-18) can only be associated with a single Visit Number (PV1-19).

Intelerad advises that HL7 systems should not send visit numbers (PV1-19) to avoid binding errors. If the HL7 system must send a PV1 segment that contains a PV1-19 field (Visit Number), then the PACS also verifies these conditions:

Examples of Binding Errors

In a case where your RIS performs a patient merge operation (the patient ID changes) without sending a corresponding message to the IntelePACS, an order binding error is likely to occur.

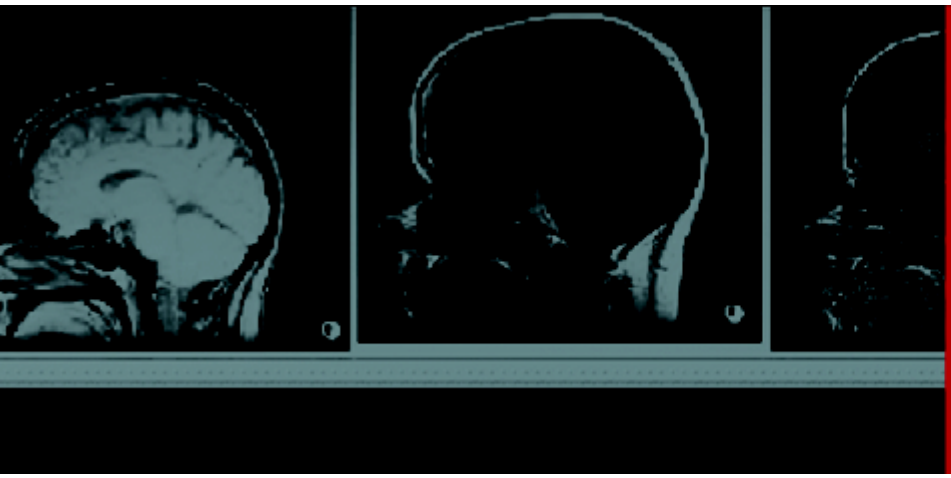
Binding errors can also be caused if the visit number is changed for a study.

Some HL7 software “recycle” accession numbers that are cancelled. This is highly inadvisable and will result in binding errors.

Accepted ADT Events

The following table lists the ADT messages that IntelePACS accepts. When applying updates, IntelePACS only uses the PID segment and ignores all other segments.

	Message	Description
Update Events	ADT^A02	Patient transferred
	ADT^A06	Transfer outpatient to inpatient
	ADT^A07	Transfer inpatient to outpatient
	ADT^A08	Patient updated
	ADT^A09	Patient departing
	ADT^A10	Patient arriving
	ADT^A12	Cancel transfer
	ADT^A17	Bed swap
	ADT^A31	Update patient information
	ADT^A32	Cancel patient arriving
	ADT^A33	Cancel patient departing
Merge Events	ADT^A18	Patient merged
	ADT^A30	Merge person
	ADT^A34	Merge patient information
	ADT^A40	Merge patient, internal ID



5 Receiving Orders from IntelePACS

In some workflows, your HL7 system can receive outbound orders from IntelePACS.

In this Chapter:

Receiving New Orders from AOG 33
Receiving New Orders From OET 34
Receiving Orders Updated by Manual Order Completion 35
Receiving Orders Updated by Time-Based Completion 37
Receiving Orders Updated by Dictation 38
Receiving Cancelled Orders 39
Descriptions of Fields for Order Messages 40

Intelerad

Receiving New Orders from AOG

In some workflows, IntelePACS generates orders dynamically, only when it receives DICOM data. The Automatic Order Generation (AOG) module generates these orders.

Trigger	Effects
IntelePACS receives a study from a scanner or from another PACS.	AOG creates an order to associate with the study. If required by your workflow, IntelePACS sends the order to your HL7 system.

Below is an example of an outbound ORM^O01 message from the AOG module in IntelePACS:

```
MSH|^~\&|IntelePACS|BCR|ReceivingApp|ReceivingFacility|20100423102832||ORM^
O01|20100423102832|P|2.3
PID|||1927228||Brown^Roger^||19700203|M
PV1|||||||||^Hibroy^M||||||||||G100423102832788
ORC|NW|AS443V7|AS443V7||OC||||||||||BCR
OBR|||AS443V7|H1970CT1^Abdomen\S\ABD_PEL_WO||20100423093858|20100423102832|
20100423102832|||||||||AS443V7|1|1||||CT|||||||Fell off balcony.
```

The following table lists the fields that IntelePACS provides for ORM^O01 messages created by AOG.

Seg	Field	Length	Definition
MSH	3	180	Name of the sending application, IntelePACS.
	4	180	Name of the sending facility.
	5	180	Name of receiving application.
	6	180	Name of receiving facility.
	9	15	Message type (ORM^O01).
PID	3	20	Patient ID/MRN.
	5	64	Patient Name.
	7	26	Patient Date of Birth (*YYYYMMDD*).
	8	1	Patient Sex (M, F, O, or *blank*).
PV1	8	60	Name of the Referring Physician. The ID is not provided.
	19	20	Visit Number. Should be ignored.
ORC	2	16	Placer Order Number. It is the same as the accession number.
	3	16	Filler Order Number. It is the same as the accession number.
	5	2	Order Status (OC).
	17	8	Entering Organization.

Seg	Field	Length	Definition
OBR	3	16	Filler Order Number. It is the accession number.
	4.1	185 to 248	DICOM application entity (AE) title of the system that sent the study.
	4.2	64	Study Description.
	6	26	Requested Date/Time (*YYYYMMDDhhmm*).
	7	26	Order Created Date/Time (*YYYYMMDDhhmm*). This date and time reflects when this order was generated by AOG.
	8	26	Order Created Date/Time (*YYYYMMDDhhmm*). The same as OBR-7.
	18	16	Accession Number.
	19	16	Requested Procedure ID (1).
	20	16	Scheduled Step ID (1).
	24	2	Modality.
	31	64	Reason for Study.

Receiving New Orders From OET

In some workflows, IntelePACS provides the Order Entry Tool (OET) to allow front-desk staff to enter new orders.

Trigger	Effects
A patient arrives at a radiology facility. The front desk enters an order into IntelePACS by using OET.	OET creates an order. If required by your workflow, IntelePACS sends the order to your HL7 system.

It is also possible for authorized IntelePACS users to modify existing orders with OET. For more details, see “HL7 Fields for Order Entry Module” on page 59.

Additional ORM^O01 messages might be available for export to external HL7 systems for these events but is beyond the current scope of this document.

Below is an example of an outbound ORM^O01 message from the OET module in IntelePACS:

```
MSH|^~\&|IntelePACS|BCR|ReceivingApp|ReceivingFacility|20100427103041||ORM^
O01|20100427103041|P|2.3
PID|||1927228||Brown^Roger^||19700203|M
PV1||||||||ID101^Hibroy^M||||||||||24A2
ORC|NW|24A2|24A2||IP||||||||||BCR
OBR||24A2|24A2|SVCTWL1^SINUS-
WO|RO|201004271029||||||||||24A2||1||||CT|||||||^LT NASAL PAIN
```

The following table lists fields that IntelePACS provides for orders created by OET and sent from IntelePACS.

Seg	Field	Length	Definition
MSH	3	180	Name of the sending application, IntelePACS.
	4	180	Name of the sending facility
	5	180	Name of receiving application.
	6	180	Name of receiving facility.
	9	15	Message type (ORM^O01).
PID	3	20	Patient ID/MRN.
	5	64	Patient Name.
	7	26	Patient Date of Birth (*YYYYMMDD*).
	8	1	Patient Sex (M, F, O, or *blank*).
PV1	8	60	Name of the Referring Physician, including ID.
	19	20	Visit Number. Same as accession number.
ORC	2	16	Placer Order Number. Same as the accession number.
	3	16	Filler Order Number. Same as the accession number.
	5	2	Order Status (IP).
	17	8	Entering Organization.
OBR	2	16	Placer Order Number. Same as the accession number.
	3	16	Filler Order Number. It is the accession number.
	4.1	185 to 248	DICOM Modality Worklists.
	4.2	64	Study Description.
	6	26	Requested Date/Time (*YYYYMMDDhhmm*).
	18	16	Accession Number.
	19	16	Requested Procedure ID.
	20	16	Scheduled Step ID (1).
	24	2	Modality.
	31	64	Reason for Study.

Receiving Orders Updated by Manual Order Completion

In some workflows, IntelePACS provides the provides the Order Completion and Assignment tool to complete orders in IntelePACS.

Trigger	Effects
An administrator marks an order as completed.	IntelePACS changes the status of the order to *completed*. If required by your workflow, IntelePACS sends the updated order to your HL7 system.

```
MSH|^~\&|IntelePACS|BCR|ReceivingApp|ReceivingFacility|20100427102004||ORM^
O01|20100427102004|P|2.3
PID|||A0905|
PV1|||||||||ID101^Hibroy^M|||||||||||100379
ORC|XO|100379|100379||CM
OBR||100379|100379||||20100427092618|20100427102004|||||||||705-555-
1212|100379||1||||CT|||||||0203^Dolittle^D
```

The following table lists fields that IntelePACS provides for orders completed with the Order Completion Tool and sent from IntelePACS. For detailed information about some of these fields, see “Descriptions of Fields for Order Messages” on page 40.

Seg	Field	Length	Definition
MSH	3	180	Name of the sending application, IntelePACS.
	4	180	Name of the sending facility
	5	180	Name of receiving application.
	6	180	Name of receiving facility.
	9	15	Message type (ORM^O01)
PID	3	20	Patient ID/MRN.
PV1	8	60	Name of the Referring Physician, including ID.
	19	20	Visit Number.
ORC	2	16	Placer Order Number. Same as the accession number.
	3	16	Filler Order Number. Same as the accession number.
	5	2	Order Status (CM).
OBR	2	16	Placer Order Number. Same as the accession number.
	3	16	Filler Order Number. It is the accession number.
	7	26	Observation Date/Time (*YYYYMMDDhhmm*)
	8	26	Observation End Date/Time (*YYYYMMDDhhmm*)
	17	250	Ordering physician callback telephone number.
	18	16	Accession Number.
	19	16	Requested Procedure ID.
	20	16	Scheduled Step ID (1).
	24	2	Modality.
	31	64	Reason for Study.
	32	200	Principal Result Interpreter.

Receiving Orders Updated by Time-Based Completion

The time-based completion feature automatically marks an order as completed when a scanner or other system stops sending images to the IntelePACS after a period of time.

Trigger	Effects
A modality finishes sending a study to IntelePACS and a configured time period has elapsed.	IntelePACS changes the status of the order to *completed*. If required by your workflow, IntelePACS sends the updated order to your HL7 system.

```
MSH|^~\&|IntelePACS|BCR|ReceivingApp|ReceivingFacility|20100426162603||ORM^
O01|20100426162603|P|2.3
PID|||1927228||Brown^Roger
PV1|||||||||||||||||||249A
ORC|XO|249A|249A||CM
OBR||249A|249A||||20100426160920||||||||||249A||1
```

The following table lists fields that IntelePACS provides for orders updated by the time-based completion feature and sent from IntelePACS.

Seg	Field	Length	Definition
MSH	3	180	Name of the sending application, IntelePACS.
	4	180	Name of the sending facility.
	5	180	Name of receiving application.
	6	180	Name of receiving facility.
	9	15	Message type (ORM^O01)
PID	3	20	Patient ID/MRN.
	5	64	Patient Name.
PV1	19	20	Visit Number.
ORC	2	16	Placer Order Number. Same as the accession number.
	3	16	Filler Order Number. Same as the accession number.
	5	2	Order Status (CM).
OBR	2	16	Placer Order Number. Same as the accession number.
	3	16	Filler Order Number. It is the accession number.
	8	26	Observation End Date/Time (*YYYYMMDDhhmm*)
	18	16	Accession Number.
	19	16	Requested Procedure ID.
	20	16	Scheduled Step ID (1).

Receiving Orders Updated by Dictation

The InteleViewer Reporting Worklist module allows users to mark an order as dictated.

Trigger	Effects
A radiologist dictates a report and marks it as dictated in the InteleViewer Reporting Worklist.	IntelePACS changes the status of the order to *dictated*. If required by your workflow, IntelePACS sends the updated order to your HL7 system.

```
MSH|^~\&|IntelePACS|BCR|ReceivingApp|ReceivingFacility|20100427102606||ORM^
O01|20100427102606|P|2.3
PID|||1297228||Brown^Roger
PV1|||||||||||||||||||100420
ORC|XO|100420|100420||ZA
OBR||100420|100420|||||||||||||||100420||1|||||||||||0017^Hibroy^M^^^20100
427102606^^^^^192.168.13.140
```

The following table lists fields that IntelePACS provides for orders that are updated when a radiologist marks an order as dictated using the InteleViewer Reporting Worklist Module. For detailed information about some of these fields, see “Descriptions of Fields for Order Messages” on page 40.

Seg	Field	Length	Definition
MSH	3	180	Name of the sending application, IntelePACS.
	4	180	Name of the sending facility
	5	180	Name of receiving application.
	6	180	Name of receiving facility.
	9	15	Message type (ORM^O01).
PID	3	20	Patient ID/MRN.
	5	64	Patient Name.
PV1	19	20	Visit Number.
ORC	2	16	Placer Order Number. Same as the accession number.
	3	16	Filler Order Number. Same as the accession number.
	5	2	Order Status (ZA).
OBR	2	16	Placer Order Number. Same as the accession number.
	3	16	Filler Order Number. It is the accession number.
	18	16	Accession Number.
	19	16	Requested Procedure ID.
	20	16	Scheduled Step ID (1).
	32	200	Principal Result Interpreter.

Receiving Cancelled Orders

IntelePACS can alert your system that a procedure is cancelled.

Physical Trigger	Effect
Although there are many reasons for triggering this event, the most common is that the patient cancels an appointment.	IntelePACS changes the status of the order to *cancelled*. If required by your workflow, IntelePACS sends the updated order to your HL7 system.

```
MSH|^~\&|IntelePACS|BCR|ReceivingApp|ReceivingFacility|20100422161649||ORM^
O01|20100422161649|P|2.3
PID|||038492
PV1|||||||||||||||||||92E7
ORC|XO|92E7|92E7||CA
OBR||92E7|92E7|||||||||||||92E7||1
```

The following table lists fields that IntelePACS provides for cancelled orders sent from IntelePACS. For detailed information about some of these fields, see “Descriptions of Fields for Order Messages” on page 40.

Seg	Field	Length	Definition
MSH	3	180	Name of the sending application, IntelePACS.
	4	180	Name of the sending facility.
	5	180	Name of receiving application.
	6	180	Name of receiving facility.
	9	15	Message type (ORM^O01).
PID	3	20	Patient ID/MRN.
PV1	19	20	Visit Number.
ORC	2	16	Placer Order Number. Same as the accession number.
	3	16	Filler Order Number. Same as the accession number.
	5	2	Order Status (CA).
OBR	2	16	Placer Order Number. Same as the accession number.
	3	16	Filler Order Number. It is the accession number.
	18	16	Accession Number.
	19	16	Requested Procedure ID.
	20	16	Scheduled Step ID (1).

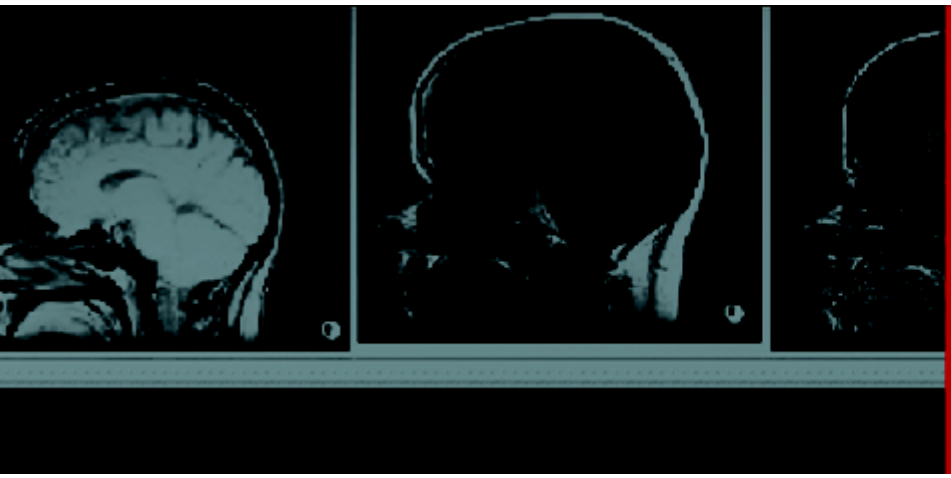
Descriptions of Fields for Order Messages

This section describes some of the fields in order messages.

Principal Result Interpreter (OBR-32)

In outbound orders from IntelePACS to an HL7 system, IntelePACS provides information about the radiologist who dictated the report.

Field Component	Name	Definition/Details
OBR-32.1	Radiologist ID	A unique ID that is configured in the IntelePACS user account for this radiologist.
OBR-32.2 - 32.4	Radiologist Name	*LAST^FIRST^MIDDLE*
OBR-32.6	Dictation Date/Time	*YYYYMMDDhhmm*
OBR-32.11	IP Address	The IP address of the workstation on which the radiologist dictated a report for this order. IntelePACS only provides this information for orders that have been marked as dictated using the InteleViewer Reporting Worklist.



6 Receiving Reports from IntelePACS

In some workflows, your HL7 system can receive outbound reports from IntelePACS.

In this Chapter:

About Receiving Reports from IntelePACS 43
Descriptions of Fields for Report Messages 45

Intelerad

About Receiving Reports from IntelePACS

A report message from IntelePACS informs your system about a report for an order. This section documents the public outbound report format for reports generated by the Intelerad Results Reporting module. It does not cover formats produced by third party transcription systems that interact with IntelePACS.

Physical Triggers	Effects
A transcriptionist transcribes a preliminary report into IntelePACS.	If required by your workflow, IntelePACS is configured to send a message to your system for the preliminary report.
A transcriptionist transcribes an addendum to a preliminary report into IntelePACS.	If required by your workflow, IntelePACS is configured to send a message to your system for the preliminary addendum.
A radiologist finalizes a report or addendum in IntelePACS.	Your system receives a message for a final report or addendum.
An IntelePACS administrator marks a report as deleted.	If required by your workflow IntelePACS is configured to send a message to your system for the report deletion.

Below is an example of an outbound report message:

```
MSH|^~\&|INTELEPACS|Intelerad|RIS|BCREEK|20080124164827||ORU^R01|||2.3
PID|||1234||Brown^Roger^||19700203|M
ORC||885|885||ZZ||||||||||||BCR
OBR||885|885|||||||||||||||885|1|1|||||F|||||||48^Doe^John^^^2009011617440
5|||52^Lee^Hugh^^^20090117083405
OBX|1||||Original report.||||||F
```

This table lists the fields that IntelePACS uses to indicate the state of the outbound report that it sends to your system.

Event	ORC-5	OBR-25	OBX-11
Preliminary Report	ZY	P	P
Preliminary Addendum	ZY	C	C
Final Report	ZZ	F	F
Final Addendum	ZZ	C	C
Delete Report	ZW	D	D

In a deleted report, IntelePACS appends a short phrase to the OBX-5 field that contains the name of the user who deleted the report. This phrase also includes the date and time that the report was deleted. For example:

Deleted by: Mary Hibroy (May 28, 2010 14:12:54)

The following table lists the fields that the IntelePACS sends. For detailed explanations of these fields, see "Descriptions of Fields for Report Messages" on page 45.

Seg	Field	Length	Definition
MSH	3	180	Name of your sending application
	4	180	Name of your sending facility
	5	180	Name of receiving application (INTELEPACS)
	6	180	Name of receiving facility (Intelerad)
PID	3	20	Patient ID/MRN
	5	64	Patient Name
	7	26	Patient Date of Birth (*YYYYMMDD*)
	8	1	Patient Sex (M, F, O, or *blank*)
ORC	2	16	Placer Order Number. This number either comes from the original order that was received from a RIS or generated by IntelePACS.
	3	16	Filler Order Number. This number either comes from the original order that was received from a RIS or generated by IntelePACS.
	5	2	Order Status. Contains ZZ for final reports and ZY for preliminary reports. In most cases only final reports are sent from IntelePACS.
	17	8	Entering Organization
OBR	2	16	Placer Order Number. This number either comes from the original order that was received from a RIS or generated by IntelePACS.
	3	16	Filler Order Number. This number either comes from the original order that was received from a RIS or generated by IntelePACS.
	18	16	Accession Number
	19	16	Requested Procedure ID
	20	16	Scheduled Step ID (1)
	25	1	Observation Result Status. Contains P for preliminary, F for final, C for addendum, and D for deleted.
	32	200	Principal Result Interpreter
	35	200	Transcriptionist
OBX	5	64K	Observation Value, including the name of the user who deleted the report and the date on which the report was deleted.
	11	1	Result status. Contains P for preliminary, F for final, C for addendum, and D for deleted.

Descriptions of Fields for Report Messages

This section describes some of the fields in report messages sent from IntelePACS.

Entering Organization (ORC-17)

Entering Organization is a code for uniquely identifying the department or group to which an order or report belongs. IntelePACS uses this information to restrict access to patient information, for differentiating items in the Reporting Worklist, and for RIS-driven prefetching.

Examples:

• A radiology practice offers its services to several clients, with each client using a unique organization code. The PACS administrator can configure the PACS so that the users from each client may only see the reports for their own orders.

• A radiologist can sort and filter studies in the Reporting Worklist to read studies for specific organizations.

• A PACS administrator can configure the IntelePACS to prefetch studies for a department's orders that meet the clinical or regulatory requirements that this department specifies.

Note: This field is required when the IntelePACS is configured for site code restrictions. Orders and reports without this field are not accessible by users.

Procedure ID (OBR-19)

If orders from your system can have multiple procedures, then your system must provide a unique ID for each procedure in the order. If your system only associates one procedure to each order, then you can set this field to 1.

For more information, see "Specifying Visit, Order, and Procedure Identifiers" on page 3.

Principal Result Interpreter (OBR-32)

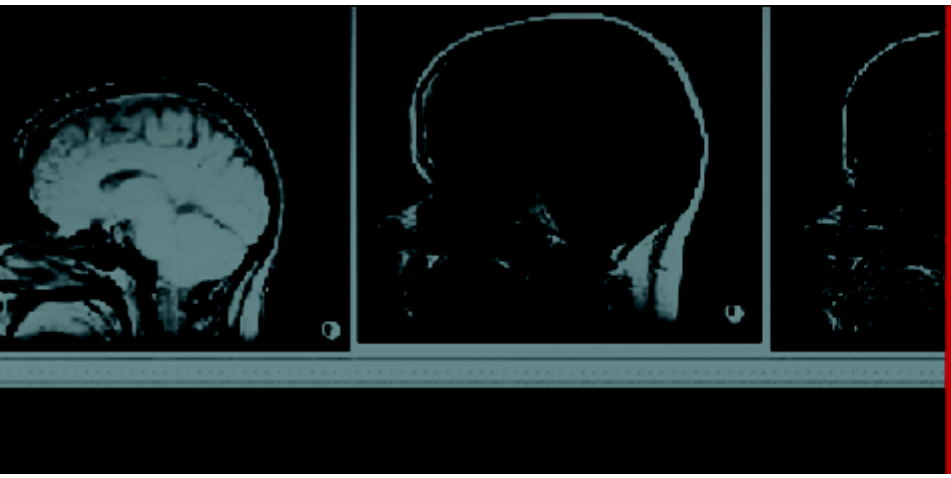
In outbound reports from IntelePACS to an HL7 system, IntelePACS provides information about the radiologist who dictated the report.

Field Component	Name	Definition/Details
OBR-32.1	Radiologist ID	A unique ID that is configured in the IntelePACS user account for this radiologist.
OBR-32.2 - 32.4	Radiologist Name	*LAST^FIRST^MIDDLE*
OBR-32.6	Dictation Date/Time	*YYYYMMDDhhmm*

Transcriptionist (OBR-35)

In outbound reports from IntelePACS to an HL7 system, IntelePACS provides information about the transcriptionist who entered a report.

Field component	Name	Definition/Details
OBR-35.1	Transcriptionist ID	A unique ID that is configured in the IntelePACS user account for this transcriptionist.
OBR-35.2 - 35.4	Transcriptionist Name	*LAST^FIRST^MIDDLE*
OBR-35.6	Transcription Date/Time	*YYYYMMDDhhmm*



A HL7 Fields for Modality Worklists

This appendix lists key HL7 fields for the DICOM Modality Worklists (DMWL) that IntelePACS provides.

In this Appendix:

Key Fields for DICOM Modality Worklists 48
Descriptions of Fields for DICOM Modality Worklists 48

Intelerad

Key Fields for DICOM Modality Worklists

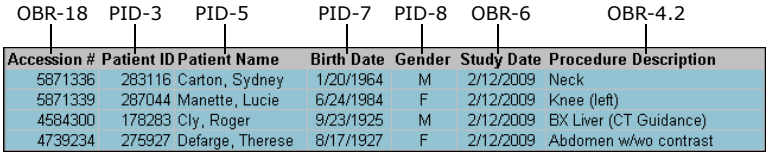
The following table shows the DICOM tags that IntelePACS provides to modalities. IntelePACS translates HL7 data into DICOM data that modalities use to fill their worklists.

The Max Length column specifies the maximum number of bytes for the DICOM tag.

DICOM	HL7	Max Length
(0008,0050) AccessionNumber	OBR-18	16
(0008,0090) ReferringPhysiciansName	PV1-8/ OBR-16	60
(0010,0010) PatientsName	PID-5	64
(0010,0020) PatientID	PID-3	20
(0010,0030) PatientsBirthDate	PID-7	26
(0010,0040) PatientsSex	PID-8	1
(0020,000d) StudyInstanceUID	ZDS-1	64
(0040,0100)>(0040,0007) ScheduledProcedureStepDescription	OBR-4.2	64
(0032,1060) RequestedProcedureDescription	OBR-4.2	64
(0040,0100)>(0040,0002) ScheduledProcedureStepStartDate (0040,0100)>(0040,0002) ScheduledProcedureStepStartTime	OBR-6	26
(0040,1001) RequestedProcedureID	OBR-19	16
(0040,0100)>(0008,0060) Modality	OBR-24	2
(0008,0100) CodeValue	OBR-44	16

Here is an example of a worklist on a scanner and the HL7 fields that were used to fill the worklist columns.

Example of a DICOM Modality Worklist on a Scanner



Descriptions of Fields for DICOM Modality Worklists

This section gives detailed descriptions of some of the HL7 fields that are useful for DICOM Modality Worklists (DMWL) that IntelePACS provides.

Patient ID (PID-3)

IntelePACS only accepts the first field component, PID-3.1, for the patient ID. Only one patient ID may be specified in this component.

Referring Physician (PV1-8)

IntelePACS uses referring physician information in several ways:

• Displays it in the InteleViewer Report Viewer, the IntelePACS Browser Report Viewer, and the Reporting Worklist.

• Triggers rules for RIS-driven prefetching.

• Grants access to studies through auto-linking.

• Automatically sends reports to referring physicians through the Report Distribution Module.

Field Component	Name	Definition/Details
PV1-8.1	Referring Physician ID	A unique ID from your system for the referring physician. This ID must match the RIS ID configured in the IntelePACS user account for this physician.
PV1-8.2 - 8.4	Referring Physician Name	*LAST^FIRST^MIDDLE*

Note: If this field is empty, IntelePACS will use Ordering Provider (OBR-16) for the referring physician information.

Study Description (OBR-4.2)

IntelePACS presents the second component of the Universal Service ID (OBR-4) as text to end users for the principal description for the study.

The maximum length for this component is 64 characters. The total maximum length of all components in the OBR-4 field is 250 characters.

Ordering Provider (OBR-16)

When a message does not specify Referring Physician (PV1-8), IntelePACS uses the ordering provider information to specify the referring physician.

Note: If a message specifies PV1-8, the IntelePACS ignores the OBR-16 field.

Field Component	Name	Definition/Details
OBR-16.1	Ordering Provider ID	A unique ID from your system. This ID must match the RIS ID configured in the IntelePACS user account for this physician.
OBR-16.2 - 16.4	Ordering Provider Name	*LAST^FIRST^MIDDLE*

Procedure ID (OBR-19)

If orders from your system can have multiple procedures, then your system must provide a unique ID for each procedure in the order. If your system only associates one procedure to each order, then you can set this field to 1.

For more information, see “Specifying Visit, Order, and Procedure Identifiers” on page 3.

Modality (OBR-24)

Scanners can use the following 2-letter codes when querying IntelePACS for their worklists.

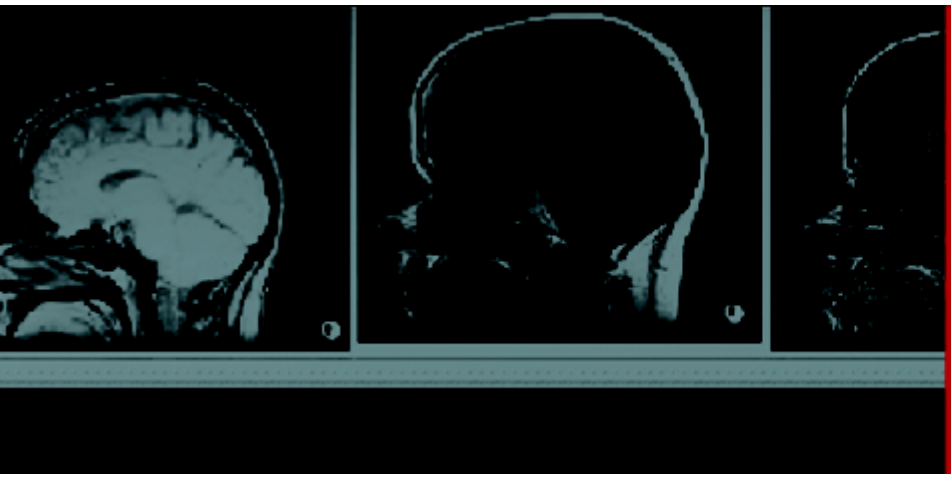
DICOM Modality Code	Code Description
AS	Angioscopy
CR	Computed Radiography
CS	Cystoscopy
CT	Computed Tomography
DM	Digital Microscopy
DR	Digital Radiography
EC	Echocardiography
ES	Endoscopy
FS	Fundoscopy
LP	Laparoscopy
MG	Mammography
MR	Magnetic Resonance
NM	Nuclear Medicine
OT	Other
PT	Positron Emission Tomography
RF	Radio Fluoroscopy

DICOM Modality Code	Code Description
TG	Thermography
US	Ultrasound
XA	X-Ray Angiography

Procedure Code (OBR-44)

The scanner, typically a CR or DR modality, translates a procedure code to a sequence of mouse clicks, keyboard strokes, or button presses for the scanner's console. These operations would otherwise be performed manually by the technologist/radiographer.

IntelePACS passes this code from your system to the scanner via the DICOM Modality Worklist. For more information on the format of this code, see the documentation from the manufacturer of the scanner.



B
HL7 Fields for RIS-Driven Prefetching

IntelePACS can prefetch studies based on HL7 data that it receives from your system, typically a RIS. IntelePACS selects which studies to prefetch by applying rules that refer to specific fields in this HL7 data.

In this Appendix:

Fields for RIS-Driven Prefetching 53
Descriptions of Fields for RIS Prefetching 54

Intelerad

Fields for RIS-Driven Prefetching

There are two types of messages that can be used to prefetch prior studies: ORM and SIU messages.

RIS-Driven Prefetching from ORM^O01 Messages

ORM^O01 ("O-R-M-caret-O-zero-one") messages are the preferred way to schedule an order in IntelePACS. ORM messages allow your system to populate more fields, which provides more flexibility in building the rules for prefetching. An ORM message with status "scheduled" (SC) will automatically be considered for prefetching. For more information, see "Scheduling a Procedure" on page 8.

Below is an example of an ORM^O01 message. The fields that can be referred to by prefetching rules are in bold.

```
MSH|^~\&|RIS|BCREEK|PACS|Intelerad|20080124164827||ORM^O01|||2.3
PID|||1234||Brown^Roger^||19700203|M
PV1|||||||MHIBROY^Hibroy^M
ORC||885|885||SC||||||||||||BGR
OBR||885|885|MRWL^SPINE||200910191345|||||||||^^^FOOT|||885|1|1||||CR||||||
||48^Doe^John
```

RIS-Driven Prefetching from SIU^S12 Messages

If your system does not send an ORM message at scheduling time, your system can instead transmit an SIU message. However, an SIU message does not provide as many fields as an ORM message, which affects the precision and effectiveness for triggering RIS-driven prefetch rules in IntelePACS.

The following message shows a sample SIU message coming to IntelePACS from an HL7 system. The fields that can be referred to by prefetching rules are in bold.

```
MSH|^~\&|RIS|BCREEK|PACS|INTELERAD|20090113162500||SIU^S12||P|2.3
PID|||1234||Smith^Roger^||19700512|M
AIL|||USWL|US|BCR|200910191345
```

Fields for RIS-Driven Prefetching

IntelePACS RIS-driven prefetching rules refer to the fields listed in the following table:

Name	ORM Field	SIU Field	Details
Patient Id	PID-3	PID-3	
Patient Name	PID-5	PID-5	
Entering Organization	ORC-17	AIL-5	

Name	ORM Field	SIU Field	Details
Imaging Location	OBR-4.1	AIL-3	See "DICOM Modality Worklist Bin (OBR-4.1)" on page 55.
Study Description	OBR-4.2		See "Study Description (OBR-4.2)" on page 56.
Study Date Time	OBR-6	AIL-6	*YYYYMMDDhhmm*
Body Part Examined	OBR-15.4		Also used for denoting medical specialty in Reporting Worklist.
Referring Physician Name	PV1-8/OBR-16		See "Referring Physician (PV1-8)" on page 54 and "Ordering Provider (OBR-16)" on page 56.
Accession Number	OBR-18		See "Specifying Visit, Order, and Procedure Identifiers" on page 3.
Modality	OBR-24	AIL-4	
Radiologist	OBR-32		See "Principal Result Interpreter (OBR-32)" on page 57.

Descriptions of Fields for RIS Prefetching

This section gives detailed descriptions of some of the HL7 fields that are useful for RIS prefetching by IntelePACS.

Patient ID (PID-3)

IntelePACS only accepts the first field component, PID-3.1, for the patient ID. Only one patient ID may be specified in this component.

Referring Physician (PV1-8)

IntelePACS uses referring physician information in several ways:

• Displays it in the InteleViewer Report Viewer, the IntelePACS Browser Report Viewer, and the Reporting Worklist.

• Triggers rules for RIS-driven prefetching.

• Grants access to studies through auto-linking.

• Automatically sends reports to referring physicians through the Report Distribution Module.

Field Component	Name	Definition/Details
PV1-8.1	Referring Physician ID	A unique ID from your system for the referring physician. This ID must match the RIS ID configured in the IntelePACS user account for this physician.
PV1-8.2 - 8.4	Referring Physician Name	*LAST^FIRST^MIDDLE*

Note: If this field is empty, IntelePACS will use Ordering Provider (OBR-16) for the referring physician information.

Entering Organization (ORC-17)

Entering Organization is a code for uniquely identifying the department or group to which an order or report belongs. IntelePACS uses this information to restrict access to patient information, for differentiating items in the Reporting Worklist, and for RIS-driven prefetching.

Examples:

• A radiology practice offers its services to several clients, with each client using a unique organization code. The PACS administrator can configure the PACS so that the users from each client may only see the reports for their own orders.

• A radiologist can sort and filter studies in the Reporting Worklist to read studies for specific organizations.

• A PACS administrator can configure the IntelePACS to prefetch studies for a department's orders that meet the clinical or regulatory requirements that this department specifies.

Note: This field is required when the IntelePACS is configured for site code restrictions. Orders and reports without this field are not accessible by users.

DICOM Modality Worklist Bin (OBR-4.1)

IntelePACS uses this data for filling DICOM Modality Worklists (DMWL) and for RIS-prefetching. For more information see "Working with DICOM Modality Worklists" on page 5.

The maximum length for a DMWL name is 16 characters. Your HL7 system may specify more than one DWML specifying them as separate subcomponents. For example: `Worklist1&Worklist2&Worklist3`. The total maximum length of OBR-4 is 250 characters.

If your HL7 provides its own DMWL, then this component can be left blank but your system is required to provide a ZDS segment.

Study Description (OBR-4.2)

IntelePACS presents the second component of the Universal Service ID (OBR-4) as text to end users for the principal description for the study.

The maximum length for this component is 64 characters. The total maximum length of all components in the OBR-4 field is 250 characters.

Ordering Provider (OBR-16)

When a message does not specify Referring Physician (PV1-8), IntelePACS uses the ordering provider information to specify the referring physician.

Note: If a message specifies PV1-8, the IntelePACS ignores the OBR-16 field.

Field Component	Name	Definition/Details
OBR-16.1	Ordering Provider ID	A unique ID from your system. This ID must match the RIS ID configured in the IntelePACS user account for this physician.
OBR-16.2 - 16.4	Ordering Provider Name	*LAST^FIRST^MIDDLE*

Modality (OBR-24)

Scanners can use the following 2-letter codes when querying IntelePACS for their worklists.

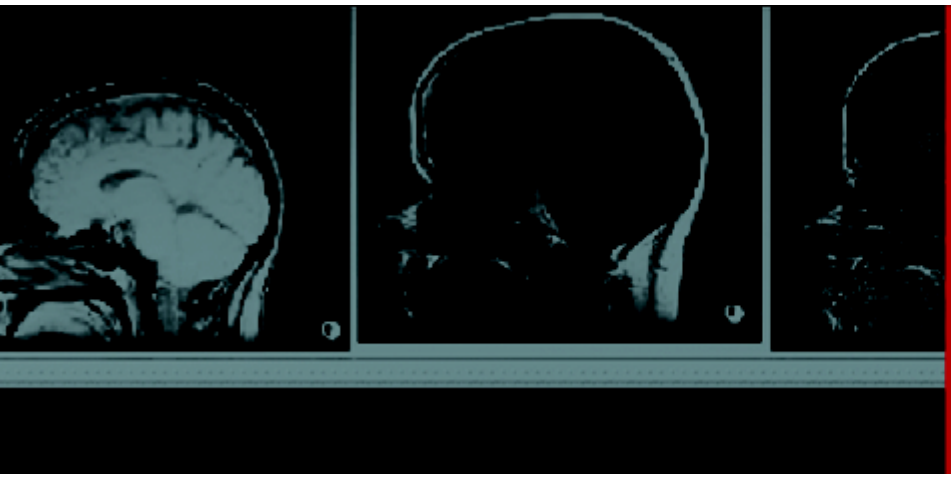
DICOM Modality Code	Code Description
AS	Angioscopy
CR	Computed Radiography
CS	Cystoscopy
CT	Computed Tomography
DM	Digital Microscopy
DR	Digital Radiography
EC	Echocardiography
ES	Endoscopy
FS	Fundoscopy
LP	Laparoscopy
MG	Mammography
MR	Magnetic Resonance
NM	Nuclear Medicine
OT	Other

DICOM Modality Code	Code Description
PT	Positron Emission Tomography
RF	Radio Fluoroscopy
TG	Thermography
US	Ultrasound
XA	X-Ray Angiography

Principal Result Interpreter (OBR-32)

In workflows where radiologists use your system to dictate reports, your system must provide identifying information about the reporting radiologist and the time of dictation. In workflows that use the Reporting Worklist from Intelerad, leave this field blank.

Field Component	Name	Definition/Details
OBR-32.1	Radiologist ID	A unique ID from your system for the radiologist. This ID must match the RIS ID configured in the IntelePACS user account for this radiologist.
OBR-32.2 - 32.4	Radiologist Name	*LAST^FIRST^MIDDLE*
OBR-32.6	Dictation Date/Time	*YYYYMMDDhhmm*



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HL7 Fields in IntelePACS

The HL7 data that IntelePACS receives is presented to users in many ways. This appendix shows how the HL7 data received by IntelePACS is displayed in IntelePACS Browser.

In this Appendix:

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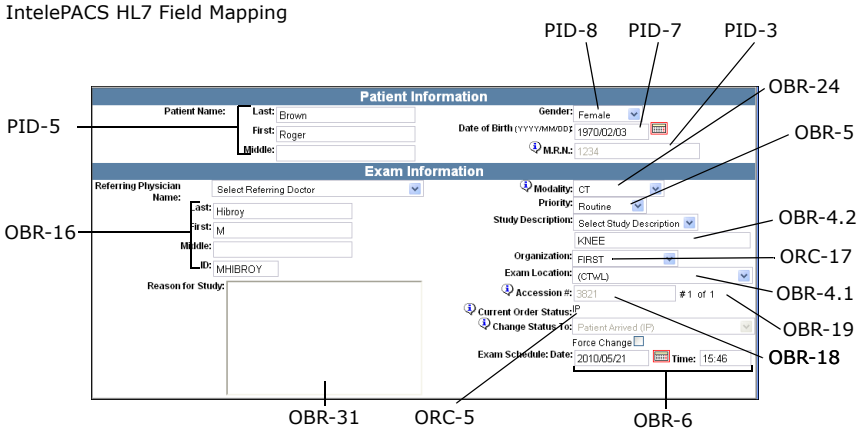
HL7 Fields for Order Entry Module

The Order Entry Module in IntelePACS Browser uses these HL7 fields to fill the items in the form for creating and modifying orders in IntelePACS.

IntelePACS HL7 Field Mapping



Document Revisions

Revision	Date	Modifications	Authors
Version 1.0	June 2, 2008	Initial creation of document.	Sean McGuire
Issue 001	April 3, 2009	First release.	Kate Hanratty, Anibal Jodorcovsky, Sean McGuire, Marc Paquette
Issue 002	June 19, 2009	Changed title to *HL7 Integration Guide*. New policy on sending visit numbers. Updated OBR-24, PID-3, OBR-16, PV1, and OBR-34. Minor corrections.	Kate Hanratty, Anibal Jodorcovsky, Sean McGuire, Marc Paquette
Issue 003	March 26, 2010	Updated OBR-16, PV1-8, ORC-17. New section, “Sending and Migrating Historical Reports” on page 23. Applied rebranded layout.	Kate Hanratty, Sean McGuire, Marc Paquette
Issue 004	May 28, 2010	New chapter, “Receiving Orders from IntelePACS” on page 32. New chapter, “Receiving Reports from IntelePACS” on page 42.	Kate Hanratty, Sean McGuire, Marc Paquette
Issue 005	April 13, 2017	Updated the cover page and headers with Intelerad's recent corporate logo.	Irene Plokar