Integrating the Healthcare Enterprise

IHE Eye Care
Technical Framework Supplement

Unified Eye Care Workflow
(U-EYECARE)

Trial Implementation

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Foreword

This is a supplement to the IHE Eye Care Infrastructure Technical Framework V3.7. Each
30   supplement undergoes a process of public comment and trial implementation before being
incorporated into the volumes of the Technical Frameworks.

This supplement is published on July 14, 2015 for trial implementation and may be available for
testing at subsequent IHE Connectathons. The supplement may be amended based on the results
of testing. Following successful testing it will be incorporated into the Eye Care Technical
35   Framework. Comments are invited and can be submitted at
http://ihe.net/Eye_Care_Public_Comments.

This supplement describes changes to the existing technical framework documents.

"Boxed" instructions like the sample below indicate to the Volume Editor how to integrate the
relevant section(s) into the relevant Technical Framework volume.

40 | *Amend Section X.X by the following:* |
|---|

Where the amendment adds text, make the added text **bold underline**. Where the amendment
removes text, make the removed text **bold strikethrough**. When entire new sections are added,
introduce with editor's instructions to "add new text" or similar, which for readability are not
bolded or underlined.

45

General information about IHE can be found at: http://ihe.net.

Information about the IHE Eye Care domain can be found at: http://ihe.net/IHE_Domains.

Information about the organization of IHE Technical Frameworks and Supplements and the
process used to create them can be found at: http://ihe.net/IHE_Process and
50   http://ihe.net/Profiles.

The current version of the IHE Eye Care Technical Framework can be found at:
http://www.ihe.net/Technical_Frameworks/.

CONTENTS

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Introduction to this Supplement

225 The Unified Eye Care Workflow (U-EYECARE) Integration Profile establishes the continuity and integrity of basic patient and procedure data in the context of an eye clinic workflow scenario. This profile deals specifically with consistent handling of patient identifiers and demographic data. It also specifies the scheduling and coordination of procedure data to a wide variety of diagnostic imaging and testing equipment.

230 The Unified Eye Care Workflow Profile takes the best features of previously defined eye care workflows, combines them into one workflow profile, and also provides more flexibility for three real world implementation models for systems such as EHRs and PACS. The models are:

- Real World Model I - EHR Implements DICOM Worklist and Integrated with a PACS

- Real World Model II - EHR Implements DICOM Worklist, Image Storage and Display
235 (With no PACS)

- Real World Model III - EHR Implements HL7 Only (no DICOM support) and Integrated with a PACS.

Each supplement undergoes a process of public comment and trial implementation before being incorporated into the volumes of the Technical Frameworks.

240 This supplement is written as changes to the documents listed below. The reader should have already read and understood these documents:

1. IHE Eye Care Technical Framework Volume 1, Integrations Profiles
2. IHE Eye Care Technical Framework Volume 2, Transactions

This supplement also references other documents[1]. The reader should have already read and
245 understood these documents:

1. Radiology Technical Framework Volume 1, Integration Profiles
2. Radiology Technical Framework Volume 2, Transactions
3. Cardiology Technical Framework Volume 2, Transactions
4. HL7 and DICOM standards documents referenced in Volume 1 and Volume 2

250 ## Open Issues and Questions

1. How does the U-EYECARE workflow Integration Profile relate or affect the other eye care workflow profiles?

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[1] The first three documents are located on the IHE Website at http://ihe.net/Technical_Frameworks. The remaining documents can be obtained from their respective publishers.

U-EYECARE Workflow takes the best of each workflow and combines them into one (plus adds new capabilities). The TC's opinion is that U-EYECARE is very relevant to eye care workflow and improves product integration within an ambulatory eye care clinic. It does not address or modify other workflow profiles (A, B and C EYECARE).

IHE Eye Care committee highly recommends that implementations of the other workflows migrate to U-EYECARE.

For installed based reasons the TC also recommends that implementations continue support of A, B, and C workflows.

2. In the future, the TC will consider "retiring" part or all of the other workflows.

3. In the transaction Procedure Scheduled [RAD-4] with HL7 v2.5.1 option, the DICOM Study Instance UID is required in a Z segment. But for the option where the DSS/OF does not support DICOM, this is not easily generated. Do we need a different transaction that does not require the Study Instance UID?

A new transaction Procedure Scheduled [EYECARE-21] has been created which makes the Z segment conditional upon the use of Real World Models A and B. It is not required for the case when the DSS/Order Filler does not support DICOM.

4. Do we wish to add an optional transaction for the Image Manager/Image Archive to send a HL7 message (most likely an ORR or ORU), to convey to the DSS/OF that the imaging study has been completed?

An option has been defined for the Procedure Scheduled [EYECARE-21]; it is called Imaging Procedure Status Update (HL7). This allows the Image Manager/Image Archive to send an HL7 OMG message to update the status.

5. Eye Care Measurement Option defined the use of DICOM SOP Classes to capture refractive measurement options. This has been defined for since 2008 with very little real world implementation. IHE Eye Care is currently considering another approach to integrate measurements from the acquisitions; however, this may not be completed in 2015. Should we kept this option or delete from this profile?

Public comment feedback on the open item opinions is encouraged.

Closed Issues

290   See above open items.

General Introduction

Update the following Appendices to the General Introduction as indicated below. Note that these are not appendices to Volume 1.

Appendix A - Actor Summary Definitions

295   *Add the following actors to the IHE Technical Frameworks General Introduction list of Actors:*

Actor	Definition
Appointment Scheduler	An information system responsible for scheduling patient appointments. It performs scheduling features such as, new appointment, confirmed appointment, patient checked in, cancelled, deleted, etc.
Appointment Consumer	An information system responsible for consuming patient appointment information. It updates its system with the appointment information and statuses.
Image Storage/Display	A system responsible for receiving DICOM SOP Instances, storing those SOP Instances, and the ability to present them for viewing to the user.
Patient Registration Source	A system responsible for the generation of patient demographic and visit information. It registers new patients and provides updates.
Patient Registration Consumer	A system responsible for consuming patient demographic and visit information.

Appendix B - Transaction Summary Definitions

Add the following transactions to the IHE Technical Frameworks General Introduction list of Transactions:

300

Transaction	Definition
Patient Demographics Update [EYECARE-19]	Enables systems to update patient demographic information within an ambulatory (i.e., outpatient, such as an eye care clinic) or an in-patient setting.
Merge Patient IDs [EYECARE-20]	Enables systems to merge Patient IDs for a patient that was incorrectly filed under two different identifiers.
Modality Images/Evidence Key Objects Stored [EYECARE-18]	Requires acquisitions systems to select and send key image/measurement objects to a storage/display system (i.e., not an image archive). Also enables Image Manager/Image Archive actors to send selected key images/measurements.
Procedure Scheduled [EYECARE-21]	An HL7 OMG V2.5.1 message from the DSS/Order Filler to notify the Image Manager/Image Archive that a procedure has been scheduled.
Procedure Status Update [EYECARE-22]	An HL7 OMG V2.5.1 message from the Image Manager/Image Archive to convey an order status update (such as completed and images available). It updates the order created from the Procedure Scheduled [EYECARE-21] transaction.

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Glossary

Add the following glossary terms to the IHE Technical Frameworks General Introduction Glossary:

No glossary terms added.

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Volume 1 – Integration Profiles

305

Copyright Licenses

NA

Domain-specific additions

NA

310 ## 1.7 History of Annual Changes

Add the following bullet to the end of the bullet list in Section 1.7

During the maturation process of IHE Eye Care, IHE Eye Care has developed multiple workflow integrations profiles, such as Advanced Workflow, Basic Workflow and Core Workflow. These workflows are based upon each other but also have their own unique set of features and
315 advantages. This Unified Eye Care Workflow Profile takes the best features of those workflows, combines them into one workflow profile, and also provides more flexibility for three real world implementation models for systems such as EHRs and PACS.

Add the following to Section 1.n:

1.n Copyright Permission

320 No changes.

2.1 Dependencies among Integration Profiles

Add the following to Figure 2-1

Eye Care Workflow

Manage Eye Care Workflow

A-EYECARE, B-EYECARE,
C- EYECARE & **U-EYECARE**
(IHE Eye Care)

Patient Admin Mgt.
Create and manage patient demographics

Scheduled Workflow
Admit, order, schedule, worklist status, create, manage, store, display images, etc.
(IHE Radiology)

Eye Care Charge Posting
Collect and post timely billable procedure details
(IHE Radiology and Eye Care)

Eye Care Evidence Document
Create, store, retrieve & use objects to record Eye Care evidence
(IHE Eye Care)

Eye Care Displayable Report
Create, store & retrieve displayable (PDF) clinical professional report
(IHE Eye Care)

Evidence Document
Create, store, retrieve & use objects to record evidence
(IHE Radiology)

325 | *Add the following to Table 2-1*

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14

Unified Eye Care Workflow	RAD TF Scheduled Workflow Advanced Eye Care Workflow Basic Eye Care Workflow Core Eye Care Workflow	This profiles uses definitions from those specified	

Add the following section to Section 2.2

2.2.9 Unified Workflow Integration Profile (U-EYECARE)

330 This Unified Eye Care Workflow (U-EYECARE) Integration Profile establishes the continuity and integrity of basic patient and procedure data in the context of an eye clinic workflow scenario. This profile deals specifically with consistent handling of patient identifiers and demographic data. It also specifies the scheduling and coordination of procedure data to a wide variety of diagnostic imaging and testing equipment.

335 This Unified Eye Care Workflow Profile takes the best features of those workflows, combines them into one workflow profile, and provides more flexibility for three real world implementation models for systems such as EHRs and PACS. The models are:

- Real World Model I– EHR Implements DICOM Worklist and Integrated with a PACS

- Real World Model II – EHR Implements DICOM Worklist, Image Storage and Display
340 (With no PACS)

- Real World Model III – EHR Implements HL7 Only (no DICOM support) and Integrated with a PACS

2.3 Actors Descriptions

Add column to Table 2.3-1

345

Add column to Table 2.3-1 and row for Image Storage/Display

Table 2.3-1: Integration Profile Actors

Actor \ Integration Profile	Unified EYE CARE Workflow
Acquisition Modality	**X**
Acquisition Modality Importer	**X**
Appointment Scheduler	**X**
Appointment Consumer	**X**

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	Integration Profile	Unified EYE CARE Workflow
Actor		
Charge Processor		**X**
Department System Scheduler/Order Filler		**X**
Evidence Creator		**X**
Image Archive		**X**
Image Display		**X**
Image Manager		**X**
Image Storage/Display		**X**
Patient Registration Source		**X**
Patient Registration Consumer		**X**
Performed Procedure Step Manager		**X**
Report Creator		
Report Reader		
Report Repository		

2.4 Transaction Descriptions

350 *Add column to Table 2.4-1*

Patient Demographics Update – Enables systems to update patient demographic information within an ambulatory (i.e., outpatient, such as an eye care clinic) or an in-patient setting. [EYECARE-19].

355 **Merge Patient IDs –** Enables systems to merge Patient IDs for a patient that was incorrectly filed under two different identifiers [EYECARE-20].
Modality Images/Evidence Key Objects Stored – Requires acquisitions systems to select and send key image images/evidence objects to a storage/display system (i.e., not an image archive). [EYECARE-18].

360 **Procedure Scheduled –** An HL7 OMG V2.5.1 message from the DSS/Order Filler to notify the Image Manager /Image Archive that a procedure has been scheduled.). [EYECARE-21].
Procedure Status Update – An HL7 OMG V2.5.1 message from the Image Manager/Image Archive to convey an order status update (such as completed and images available). It updates the order created from the Procedure Scheduled [EYECARE-21] transaction.

365

Add column to Table 2.4-1 and insert new rows as follows

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Table 2.4-1: Integration Profile Transactions

Transaction / Integration Profile	Unified EYE CARE Workflow
Patient Encounter Management [ITI-31]	
Patient Registration [EYECARE-15]	**X**
Placer Order Management [RAD-2]	
Filler Order Management [RAD-3]	
Appointment Scheduling Management [EYECARE-16]	**X**
Procedure Scheduled [RAD-4]	
Procedure Scheduled [EYECARE-21]	**X**
Procedure Status Update [EYECARE-22]	**X**
Query Modality Worklist [EYECARE-1]	**X**
Modality Procedure Step In Progress [RAD-6]	**X**
Modality Procedure Step Completed [EYECARE-6]	**X**
Modality Images/Evidence Stored [EYECARE-2]	**X**
Modality Images/Evidence Key Objects Stored [EYECARE-18]	**X**
Storage Commitment [CARD-3]	**X**
Patient Update [RAD-12]	
Procedure Update [RAD-13]	
Patient Demographics Update [EYECARE-19]	**X**
Merge Patient IDs [EYECARE-20]	**X**
Query Images [EYECARE-5]	**X**
Retrieve Images [EYECARE-3]	**X**
Charge Posted [RAD-35]	
Eye Care Charge Posted [EYECARE-17]	**X**
Account Management [RAD-36]	
Query Evidence Documents [EYECARE-4]	
Retrieve Evidence Documents [RAD-45]	
Displayable Report Storage [EYECARE-7]	
Query Displayable Report [EYECARE-8]	
Retrieve Displayable Report [EYECARE-9]	

370

13 Unified EYE CARE Workflow (U-EYECARE)

The Unified Eye Care Workflow (U-EYECARE) Integration Profile establishes the continuity and integrity of basic patient and procedure data in the context of an eye clinic workflow scenario. This profile deals specifically with consistent handling of patient identifiers and demographic data. It specifies the scheduling and coordination of procedure data to a wide variety of diagnostic imaging and testing equipment and the ability to post eye care charges.

During the maturation process of the IHE Eye Care domain, it has developed multiple workflow integrations profiles, such as Advanced Workflow, Basic Workflow and Core Workflow. These workflows are based upon each other but also have their own unique set of features and advantages.

This Unified Eye Care Workflow Profile takes the best features of those workflows, combines them into one workflow profile, and provides more flexibility for three real world implementation models for systems such as EHRs and PACS. An overview of the features is:
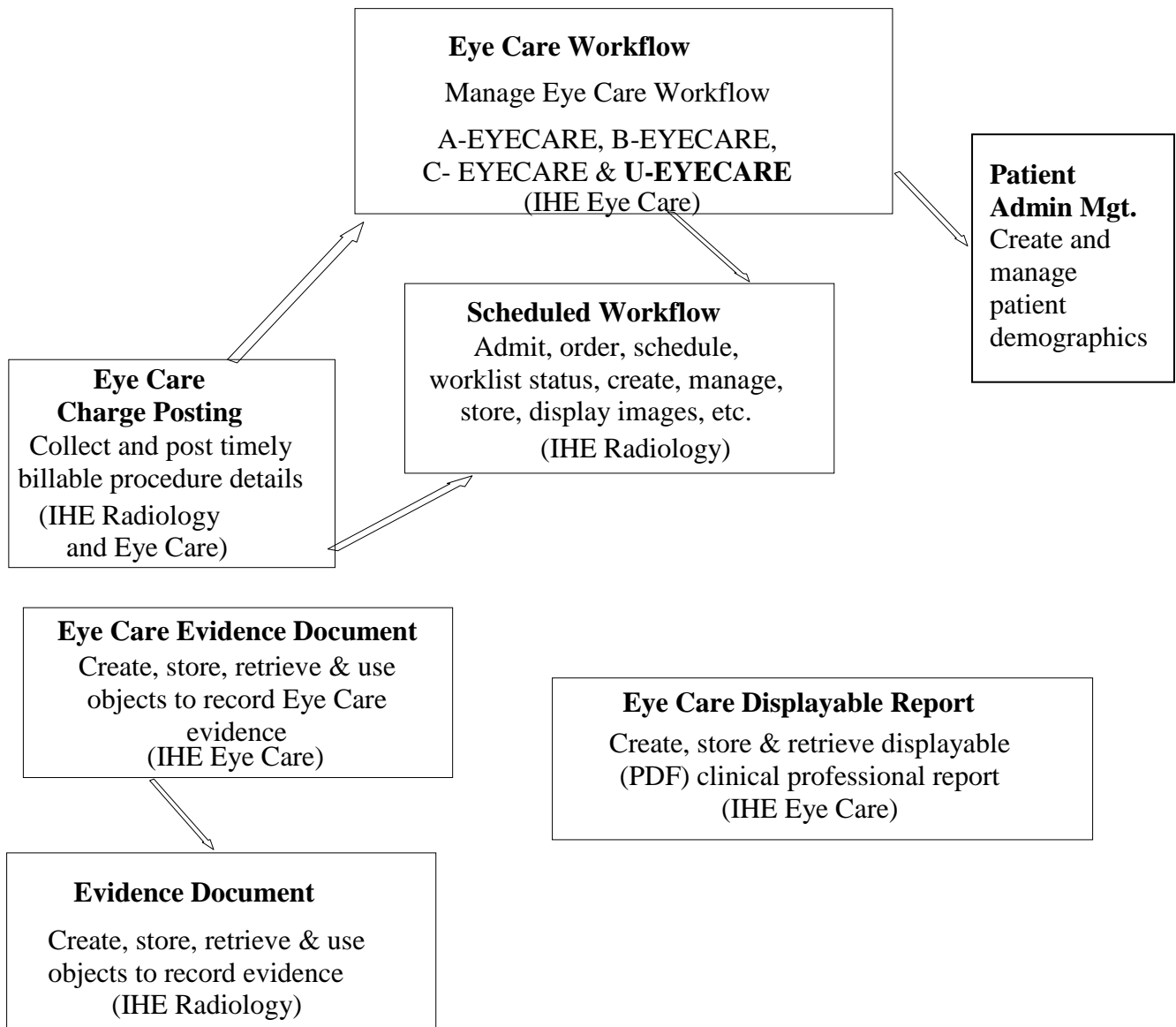
- **Patient Registration and Appointment Scheduling:**
  These messages are typically sent between Practice Management Systems (PMS) and EHRs. Patient registration and updates to patient demographic data are based upon HL7 ADT messages (A04 and A08). Management of patient appointment data (i.e., new appointments, confirmed appointments, patient checked in, cancelled, deleted, etc.) is based upon HL7 SIU messages.

  All HL7 messages in U-EYECARE utilize HL7 v2.5.1.

  Optional features include merging patient IDs and the ability to post billing charges.

  The patient registration and appointments workflow is the same for all real world implementation models.

  See Section 13.1.1 and 13.4.1.

- **Real World Model I - EHR Implements DICOM Worklist and Integrates with a PACS:**
  Real World Model I addresses a scenario where organizations have a Practice Management System (PMS), Electronic Health Record System (EHR), centralized Image Archive, Image Display (PACS) and eye care diagnostic imaging and testing equipment (fundus cameras, slit lamps, refractive measurement devices, visual fields etc.).

  This model specifies the Transactions and Actors required for the scenario where the DSS/Order Filler Actor (i.e., typically an EHR) supports DICOM Modality Worklist and is integrated with the Image Manager/Image Archive (i.e., typically a PACS).

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See Section 13.1.2 and 13.4.2.

- **Real World Model II - EHR Implements DICOM Worklist, Image Storage and Display (With no PACS):**
  410
  Real World Model II addresses a scenario where organizations have a Practice Management System (PMS), Electronic Health Record System (EHR) and eye care diagnostic imaging and testing equipment (fundus cameras, slit lamps, refractive measurement devices, visual fields etc.). The EHR performs the storage (not archive) and
  415
  display of DICOM images, measurements, etc.

  This model reduces the PACS implementation requirements of the other eye care workflows by not integrating an Image Archive (i.e., PACS system) and places more responsibility on the EHR and acquisition devices. **Therefore, users of this model must**
  420
  understand that acquisition devices and users are responsible for the safe keeping of the images and/or measurements created upon their system. It is important for users to determine how this is accomplished so that patient data is protected. How this is accomplished is outside the scope of IHE.

  425
  This model specifies the Transactions and Actors required for the scenario where the DSS/Order Filler Actor (i.e., typically an EHR) supports DICOM Modality Worklist, Image Storage and Display. Real World Model II does not include an Image Manager/Image Archive Actor (i.e., a PACS system). Acquisition Modality Actors (i.e., eye care instruments) have the requirement to send selective images and/or
  430
  measurements.

  See Section 13.1.3 and 13.4.3.

- **Real World Model III - EHR Implements HL7 Only (no DICOM support) and Integrated with a PACS:**
  Real World Model III addresses a scenario where organizations have a Practice
  435
  Management System (PMS), Electronic Health Record System (EHR), centralized Image Archive, Image Display (PACS) and eye care diagnostic imaging and testing equipment (fundus cameras, slit lamps, refractive measurement devices, visual fields, etc.).

  This model specifies the Transactions and Actors required for the scenario where the
  440
  DSS/Order Filler Actor (i.e., typically an EHR) does <u>not</u> support DICOM and only implements HL7 messages. Therefore, the Image Manager/Image Archive supports DICOM Modality Worklist. All messages utilize HL7 v2.5.1.

  See Section 13.1.4 and 13.4.4.

- **Optional Transactions:**
  445
  Many of the transactions supported by the other eye care workflow profiles are included

as optional transactions in U-EYCARE, such as those based upon DICOM Modality Performed Procedure Step, DICOM Storage Commitment, etc.

- **Order Placer Actor not supported:**
450 The Order Placer Actor defined in Advanced and Basic Eye Care Workflow is not supported in this profile. The primary feature for this Actor is the integration of an eye care clinic with a hospital information system (i.e., the HIS registers patients and orders eye care procedures that are processed by eye care systems (such as a PMS and EHR)). If vendors wish to implement these features, they must support actors in the Advanced and/or Basic Eye Care Profile.

455 13.1 U-EYECARE Actors and Transactions

This section defines the actors, transactions, and/or content modules in this profile. General definitions of actors are given in the Technical Frameworks General Introduction Appendix A at http://ihe.net/Technical_Frameworks/.

13.1.1 Patient Registration and Appointment Scheduling

460 U-EYECARE enables many features in other eye care workflow profiles; therefore there are many different real-world configurations and options supported. The figures below illustrate some of real-world configurations examples.

Figure 13.1.1-1 shows the actors directly involved in the U-EYECARE Profile relevant to the patient registration and appointment scheduling workflow and the relevant transactions between 465 them. The Actors and Transactions shown are supported in all Real World Models. Actors which have a mandatory grouping are shown in conjoined boxes.

Note: Merge Patient ID [EYECARE-20] and Eye Care Charge Posted [EYECARE-17] are optional transactions.
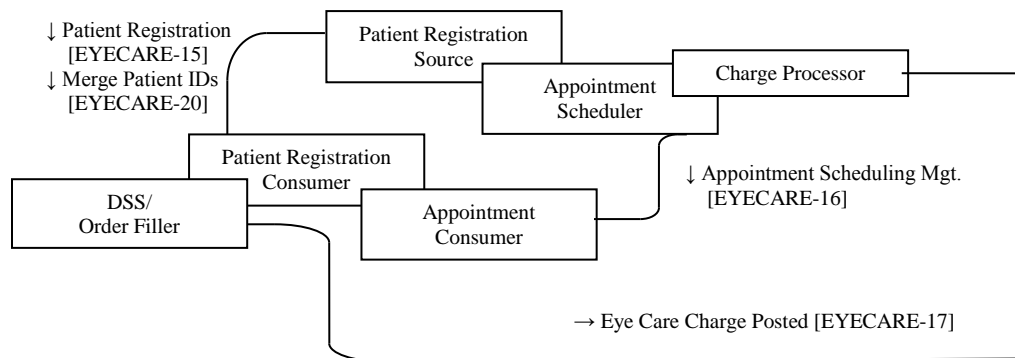
Figure 13.1.1-1: Patient Registration and Appointment Scheduling Workflow Diagram

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IHE Eye Care does not specify real world systems that implement IHE Actors. However, certain Actors (and/or combination of Actors) often make sense for specific products. For example, a Practice Management System (PMS) real world product may be the type of system that implements the Patient Registration Source, Appointment Scheduler and Charge Processor
475 Actors. An Electronic Heath Record (EHR) real world product may be the type of system that implements the Patient Registration Consumer, Appointment Consumer and Department System Schedule/Order Filler (see Figure 13.1.1-2).

Note: Merge Patient ID [EYECARE-20] and Eye Care Charge Posted [EYECARE-17] are optional transactions.
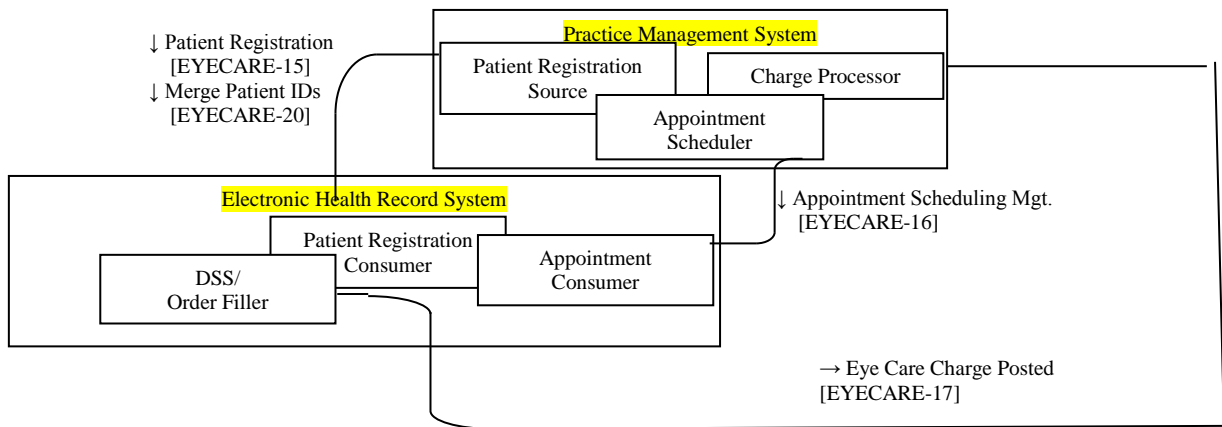
480 **Figure 13.1.1-2: (Informative) Actors Mapping to Real World Systems**

13.1.2 Real World Model I - EHR Supports DICOM Worklist and Integrated with a PACS

Real World Model I addresses a scenario where organizations have a Practice Management
485 System (PMS), Electronic Health Record System (EHR), centralized Image Archive, Image Display (PACS), and eye care diagnostic imaging and testing equipment (fundus cameras, slit lamps, refractive measurement devices, visual fields etc.).

Figure 13.1.2-1 shows the actors directly involved in the U-EYECARE Profile relevant to the scenario were the DSS/Order Filler (i.e., typically an EHR) supports DICOM worklist and is
490 integrated with an Image Manager/Image Archive (i.e., typically a PACS). Actors which have a mandatory grouping are shown in conjoined boxes. Only required transactions are shown, optional transactions have been omitted from the diagram.

Note: The ability to display DICOM images, measurements and reports on an EHR is often a desired feature for users. If the EHR does not support DICOM display capabilities, they sometimes use proprietary mechanisms typically called a
495 "context launch" that will run the PACS' display software on the EHR. How or if this is accomplished is outside the scope of IHE.

Figure 13.1.2-1: Real World Model I - Workflow Diagram

500

13.1.3 Real World Model II - EHR Supports DICOM Worklist, Image Storage and Display (With no PACS)

Real World Model II addresses a scenario where organizations have a Practice Management System (PMS), Electronic Health Record System (EHR) and eye care diagnostic imaging and
505 testing equipment (fundus cameras, slit lamps, refractive measurement devices, visual fields etc.). The EHR performs the storage (not archive) and display of DICOM images, measurements, etc.

Figure 13.1.3-1 shows the actors directly involved in the U-EYECARE Profile relevant to the scenario were the DSS/Order Filler (i.e., typically an EHR) supports DICOM worklist, image
510 storage and display. In this example there is no PACS system integrated. Actors which have a mandatory grouping are shown in conjoined boxes. Only required transactions are shown, optional transactions have been omitted from the diagram.
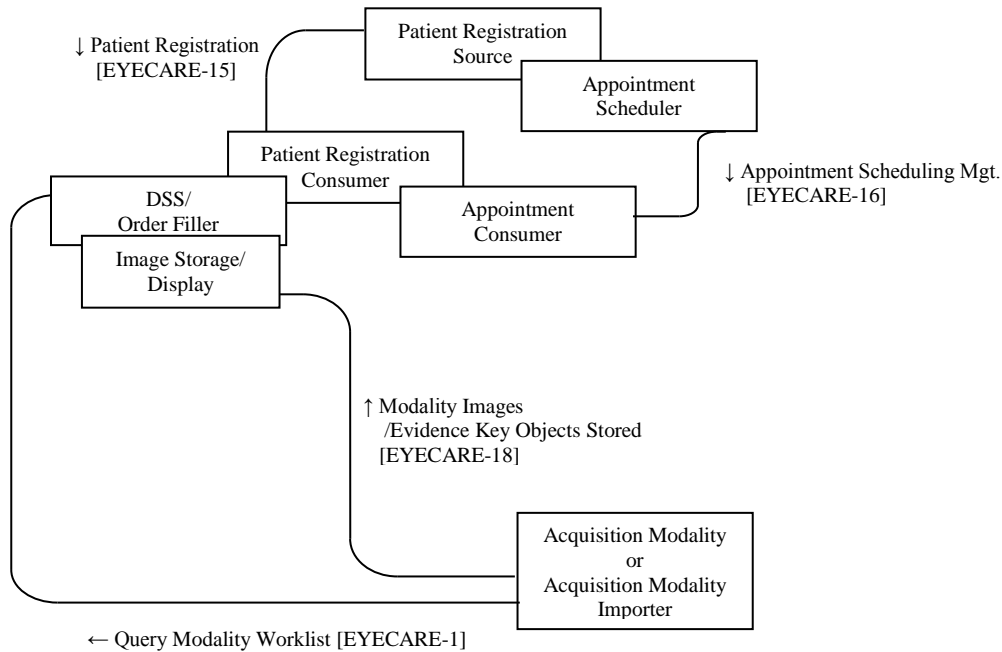
515

Figure 13.1.3-1: Real World Model II - Workflow Diagram

IHE Eye Care does not specify real world systems that implement IHE Actors. However, certain Actors (and/or combination of Actors) often make sense for specific products. For example, a Practice Management System (PMS) real world product may be the type of system that
520 implements the Patient Registration Source and Appointment Scheduler Actors. An Electronic Heath Record (EHR) real world product may be the type of system that implements the Patient Registration Consumer, Appointment Consumer, Department System Schedule/Order Filler and Image Storage/Display Actors (see Figure 13.1.3-2).

525
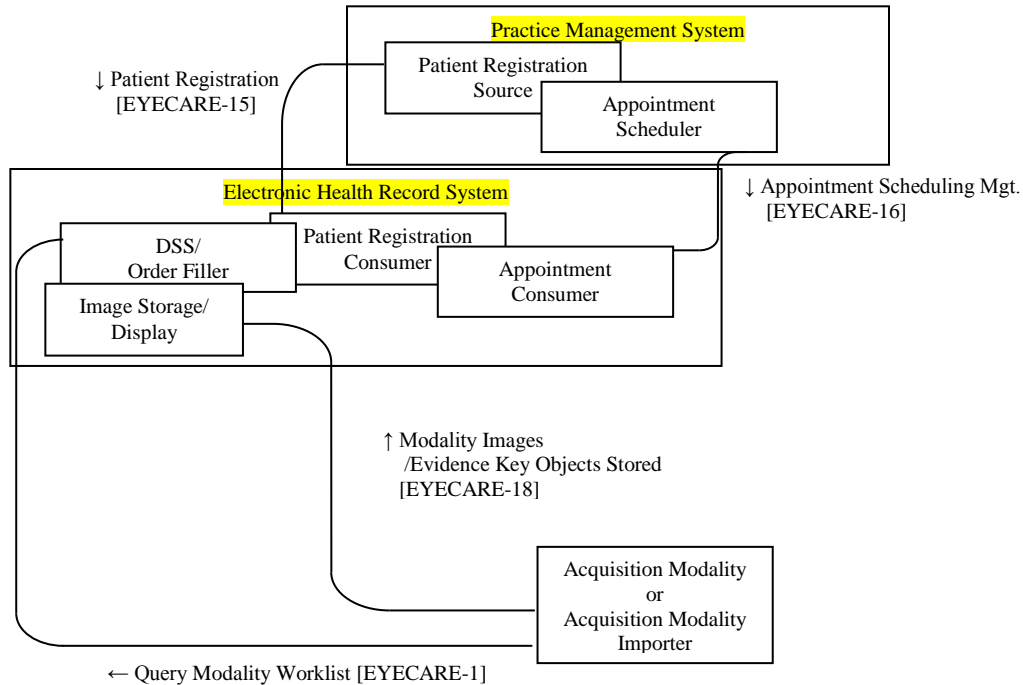
Figure 13.1.3-2: (Informative) Actors Mapping to Real World Systems

13.1.4 Real World Model III - EHR Implements HL7 Only (no DICOM support) and Integrated with a PACS

530

Real World Model III addresses a scenario where organizations have a Practice Management System (PMS), Electronic Health Record System (EHR), centralized Image Archive, Image Display (PACS), and eye care diagnostic imaging and testing equipment (fundus cameras, slit lamps, refractive measurement devices, visual fields, etc.).

535 Figure 13.1.4-1 shows the actors directly involved in the U-EYECARE Profile relevant to the scenario were the DSS/Order Filler (i.e., typically an EHR) does not support DICOM transactions (i.e., HL7 messages only), therefore the Image Manager/Image Archive supports DICOM worklist. Actors which have a mandatory grouping are shown in conjoined boxes. Only required transactions are shown, optional transactions have been omitted from the diagram.

540 Note: The ability to display DICOM images, measurements and reports on an EHR is often a desired feature for users. If the EHR does not support DICOM display capabilities, they sometimes use proprietary mechanisms typically called a "context launch" that will run the PACS' display software on the EHR. How or if this is accomplished is outside the scope of IHE.

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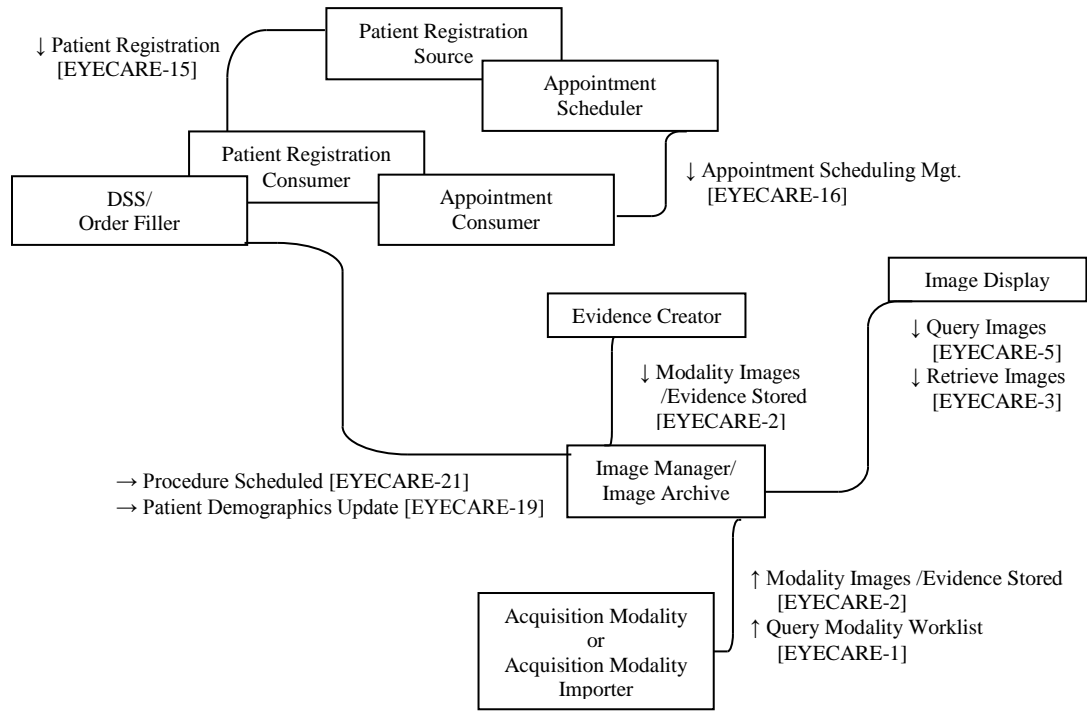
545

Figure 13.1.4-1: Real World Model III - Workflow Diagram

13.1.5 U-EYECARE Workflow with DICOM Options

Figure 13.1.5-1 shows the actors directly involved in the U-EYECARE Profile relevant to the required and optional transactions that extend the features of U-EYECARE. Most of the optional
550   transactions have been taken from the Advanced Eye Care Workflow (A-EYECARE). They are not specific to any Real World Model and may be implemented for various workflow scenarios. These options are defined in Table 13.2-1.
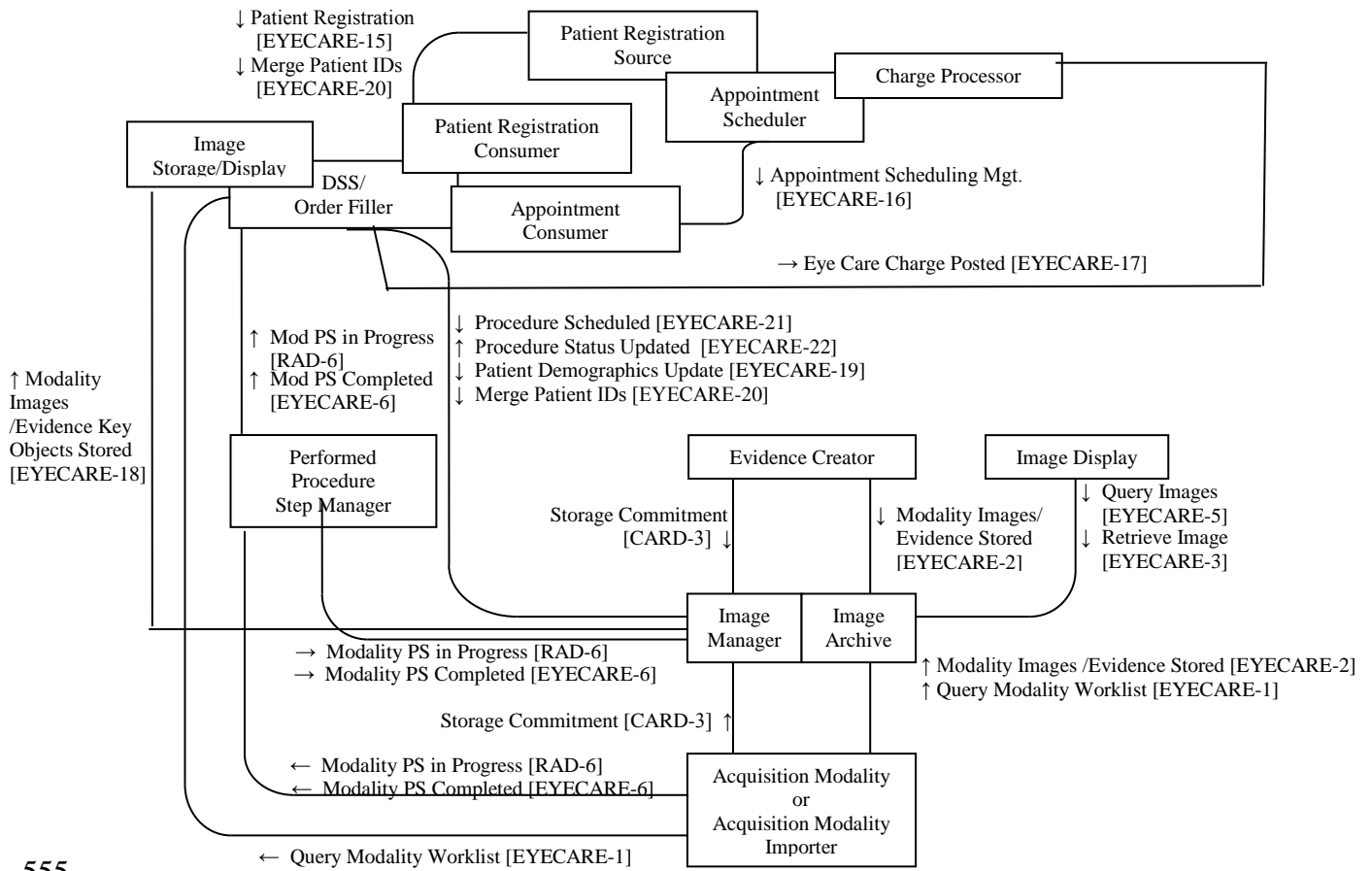
Figure 13.1.5-1: U-EYECARE Workflow with Options Diagram

13.1.6 U-EYECARE Actor/Transaction Table

560   Table 13.1.6-1 lists the transactions for each actor directly involved in the U-EYECARE Profile. To claim compliance with this profile, an actor SHALL support all required transactions (labeled "R") and may support the optional transactions (labeled "O").

565 **Table 13.1.6-1: Unified Eye Care Workflow – Actors and Transactions**

Actors	Transactions	Model I	Model II	Model III	Section
		Transaction Optionality			
Patient Registration Source	Patient Registration [EYECARE-15]	R	R	R	EYECARE TF-2: 4.15
Appointment Scheduler	Appointment Scheduling Management [EYECARE-16]	R	R	R	EYECARE TF-2: 4.16
Patient Registration Consumer	Patient Registration [EYECARE-15]	R	R	R	EYECARE TF-2: 4.15
Appointment Consumer	Appointment Scheduling Management [EYECARE-16]	R	R	R	EYECARE TF-2: 4.16
Department System Scheduler/ Order Filler	Patient Demographics Update [EYECARE-19]	R		R	EYECARE TF-2: 4.19
	Query Modality Worklist [EYECARE-1]	R	R		EYECARE TF-2: 4.1
	Procedure Scheduled [EYECARE-21]	R		R	EYECARE TF-2: 4.21
	Modality Images/Evidence Key Objects Stored [EYECARE-18]		R		EYECARE TF-2: 4.18
Image Manager/ Image Archive *(Not an Actor for Model II)*	Procedure Scheduled [EYECARE-21]	R		R	EYECARE TF-2: 4.21
	Patient Demographics Update [EYECARE-19]	R		R	EYECARE TF-2: 4.19
	Query Modality Worklist [EYECARE-1]			R	EYECARE TF-2: 4.1
	Modality Images/Evidence Stored [EYECARE-2]	R		R	EYECARE TF-2: 4.2
	Modality Images/Evidence Key Objects Stored [EYECARE-18]	R		R	EYECARE TF-2: 4.18
	Query Images [EYECARE-5]	R		R	EYECARE TF-2: 4.5
	Retrieve Images [EYECARE-3]	R		R	EYECARE TF-2: 4.3
Image Storage/Display *(Only required in Model II)*	Modality Images/Evidence Key Objects Stored [EYECARE-18]		R		EYECARE TF-2: 4.18
Image Display *(Not an Actor for Model II)*	Query Images [EYECARE-5]	R		R	EYECARE TF-2: 4.5
	Retrieve Images [EYECARE-3]	R		R	EYECARE TF-2: 4.3
Acquisition Modality	Query Modality Worklist [EYECARE-1]	R	R	R	EYECARE TF-2: 4.1
	Modality Images/Evidence Stored [EYECARE-2]	R		R	EYECARE TF-2: 4.2
	Modality Images/Evidence Key Objects Stored [EYECARE-18]		R		EYECARE TF-2: 4.18

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Actors	Transactions	Model I	Model II	Model III	Section
		Transaction Optionality			
Acquisition Modality Importer	Query Modality Worklist [EYECARE-1]	R	R	R	EYECARE TF-2: 4.1
	Modality Images/Evidence Stored [EYECARE-2]	R		R	EYECARE TF-2: 4.2
	Modality Images/Evidence Key Objects Stored [EYECARE-18]		R		EYECARE TF-2: 4.18
Charge Processor	Eye Care Charge Posted [EYECARE-17]	R	R	R	EYECARE TF-2: 4.17
Evidence Creator	Modality Images/Evidence Stored [EYECARE-2]	R		R	EYECARE TF-2: 4.2
Performed Procedure Step Manager	Modality Procedure Step In Progress [RAD-6]	R			RAD TF-2: 4.6
	Modality Procedure Step Completed [EYECARE-6]	R			RAD TF-2: 4.7

Note 1: An EHR real world product may be the type of system that implements the Patient Registration Consumer, Appointment Consumer and Department System Schedule/Order Filler Actors and possibly the Image Storage/Display Actor.

Note 2: A PMS real world product may be the type of system that implements the Patient Registration Source, Appointment Scheduler and Charge Processor Actors.

13.1.7 Actor Descriptions and Actor Profile Requirements

Most requirements are documented in Transactions (Volume 2) and Content Modules (Volume 3). This section documents any additional requirements on profile's actors and Real World Models.

13.1.7.1 Real World Models

All Actors in U-EYECARE SHALL support their required transactions for one or more Real World Models.

13.2 U-EYECARE Actor Options

Options that may be selected for each actor in this profile, if any, are listed in the Table 13.2-1. Dependencies between options when applicable are specified in notes. IHE does not place any restrictions on which options are supported for any of the Real World Models; however, some options do not make sense. For example, in Real World Model III the DSS/Order Filler does not support DICOM; therefore the optional transactions related to DICOM are not relevant.

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Table 13.2-1: Unified Eye Care Workflow - Actors and Options

Actor	Option Name	Reference
Patient Registration Source	Patient Record Merging Option	EYECARE TF-1: 13.2.2
Appointment Scheduler	*No options defined*	--
Charge Processor	*No options defined*	--
Patient Registration Consumer	Patient Record Merging Option	EYECARE TF-1: 13.2.2
Appointment Consumer	*No options defined*	--
Department System Scheduler/Order Filler	Patient Record Merging Option	EYECARE TF-1: 13.2.2
	Imaging Procedure Instructions Option	EYECARE TF-1: 13.2.3
	Imaging Procedure Status Update (DICOM) Option	EYECARE TF-1: 13.2.4
	Imaging Procedure Status Update (HL7) Option	EYECARE TF-1: 13.2.5
	Charge Posting Option	EYECARE TF-1: 13.2.7
Image Manager/ Image Archive	Patient Record Merging Option	EYECARE TF-1: 13.2.2
	Eye Care Image Option	EYECARE TF-1: 13.2.1.1
	Encapsulated PDF Option for Evidence Documents	EYECARE TF-1: 13.2.1.2
	Eye Care Measurements Option	EYECARE TF-1: 13.2.1.3
	Imaging Procedure Status Update (DICOM) Option	EYECARE TF-1: 13.2.4
	Imaging Procedure Status Update (HL7) Option	EYECARE TF-1: 13.2.5
	Storage Commitment Option	EYECARE TF-1: 13.2.6
	PACS Key Images Sent Option	EYECARE TF-1: 13.2.8
	Stereo Relationship Option	EYECARE TF-1: 3.2.4 EYECARE TF-2: 4.2.9
	Imaging Procedure Instructions Option	EYECARE TF-1: 13.2.4 EYECARE TF-2: 4.1.6
Image Display	Eye Care Image Option	EYECARE TF-1: 13.2.1.1
	Encapsulated PDF Option for Evidence Documents	EYECARE TF-1: 13.2.1.2
	Relative Image Position Coding Option	EYECARE TF-1: 3.2.2 EYECARE TF-2: 4.3.6

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Actor	Option Name	Reference
	Stereo Relationship Option	EYECARE TF-1: 3.2.4 EYECARE TF 2: 4.3.7
Image Storage/Display *(an optional actor in Model I and III)*	Eye Care Image Option	EYECARE TF-1: 13.2.1.1
	Encapsulated PDF Option for Evidence Documents	EYECARE TF-1: 13.2.1.2
	PACS Key Images Sent Option	EYECARE TF-1: 13.2.8
	Eye Care Measurements Option	EYECARE TF-1: 13.2.1.3
Evidence Creator	Storage Commitment Option	EYECARE TF-1: 13.2.6
Acquisition Modality	Patient Based Worklist Query Option (see Note 1)	EYECARE TF-2: 4.1
	Broad Worklist Query Option (see Note 1)	EYECARE TF-2: 4.1
	Eye Care Image Option (See Note 2)	EYECARE TF-1: 13.2.1.1
	Encapsulated PDF Option for Evidence Documents (See Note 2)	EYECARE TF-1: 13.2.1.2
	Eye Care Measurement Option	EYECARE TF-1: 13.2.1.3
	Imaging Procedure Status Update (DICOM) Option	EYECARE TF-1: 13.2.4
	Storage Commitment Option	EYECARE TF-1: 13.2.6
	Relative Image Position Coding Option	EYECARE TF-1: 3.2.2 EYECARE TF-2: 4.2.8
	Stereo Relationship Option	EYECARE TF-1: 3.2.4 EYECARE TF-2: 4.2.9
	Imaging Procedure Instructions Option	EYECARE TF-1: 13.2.3
Acquisition Modality Importer	Patient Based Worklist Query Option (see Note 1)	EYECARE TF-2: 4.1
	Broad Worklist Query Option (see Note 1)	EYECARE TF-2: 4.1
	Eye Care Measurement Option	EYECARE TF-1: 13.2.1.3
	Eye Care Image Option (See Note 2)	EYECARE TF-1: 13.2.1.1
	Encapsulated PDF Option for Evidence Documents (See Note 2)	EYECARE TF-1: 13.2.1.2
	Imaging Procedure Status Update (DICOM) Option	EYECARE TF-1: 13.2.4
	Storage Commitment Option	EYECARE TF-1: 13.2.6
	Relative Image Position Coding Option	EYECARE TF-1: 3.2.2 EYECARE TF-2: 4.2.8
	Stereo Relationship Option	EYECARE TF-1: 3.2.5 EYECARE TF-2: 4.2.9
	Imaging Procedure Instructions Option	EYECARE TF-1: 13.2.3

Actor	Option Name	Reference
Performed Procedure Step Manager	*No options defined*	--

> Note 1: The Radiology TF requires that the Acquisition Modality support at least one of the Worklist Query Options (i.e., Patient-Based or Broad). Eye Care requires Acquisition Modality and Acquisition Modality Importer Actors to support BOTH the Patient-Based and Broad Worklist Query Options.

> Note 2: The Acquisition Modality and Acquisition Modality Importer Actors SHALL support either the Eye Care Image Option or the Encapsulated PDF Option for Evidence Documents.

13.2.1 Acquisition Modalities Storage Options

Without support of one of the Options in this section, an Acquisition Modality, Acquisition Modality Importer and Image Storage/Display will likely support a variety of DICOM SOP Classes. It is expected that these will be documented by a reference in the IHE Integration Statement (see EYECARE TF-1: Appendix C). The options in this section 'raise the bar' by mandating support of specific DICOM SOP classes.

13.2.1.1 Eye Care Image Option

The DICOM Standard defines certain Image Storage SOP Classes that are applicable to EYECARE Acquisition Modalities, such as Ophthalmic 8 bit Photography Image Storage, Ophthalmic Tomography Image Storage, etc. See EYECARE TF-2: 4.2.5 for the complete list of SOP Classes.

Acquisition Modality or Acquisition Modality Importer Actors that support the Eye Care Image Option shall support one or more SOP Classes listed in EYECARE TF-2: 4.2.5.

Image Manager/Archive and Image Storage/Display Actors that support this option SHALL be able to store all SOP Classes listed in listed in EYECARE TF-2:.4.2.5.

Image Display and Image Storage/Display Actors that support this option SHALL be able to display all SOP classes listed in EYECARE TF-2: Table 4.2.5-1. It is expected that an Image Display or Image Storage/Display that does not support this option will be able to display a subset of the SOP classes listed in the table.

13.2.1.2 Encapsulated PDF Option for Evidence Documents

Image SOP Classes for certain Eye Care Acquisition Modalities are yet to be defined in DICOM. These Acquisition Modalities support the Encapsulated PDF Option for Evidence Documents. An Acquisition Modality may choose to support the Encapsulated PDF Option may be supported as an addition to the appropriate DICOM SOP Class.

Once the applicable SOP classes are defined by DICOM, it is recommended that the Acquisition Modalities support the Eye Care Image Option with the appropriate DICOM SOP Class.

> Note 1: For example, in IHE Eye Care Year 1 there was not a DICOM SOP class defined for Ophthalmic Tomography, therefore, these types of Acquisition Modalities only had the capability to support the Encapsulated PDF Option for

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Evidence Documents. But in Year 2 DICOM has defined such a SOP Class, therefore, they are recommended to support the approved DICOM SOP Class and additionally they may also support the Encapsulated PDF Option.

Note 2: The DICOM standard does not define use of a specific version of PDF when encapsulated PDF is used. This may result in incorrect display of reports when using a different PDF version of software from that which was used to create the files. Other issues arise when using only PDF with pixel data as the files are large and there may be difficulties with display. IHE Eye Care Technical Framework defines specific versions required for support; see EYECARE TF-2: 4.

625 Acquisition Modality, Image Manager/Image Archive and Image Storage/Display Actors that support this option SHALL comply with the storage requirements in EYECARE TF-2: 4.2.6.

Image Display and Image Storage Display actors that support this option SHALL be able to display the SOP class listed in EYECARE TF-2: Table 4.2.6-1.

13.2.1.3 Eye Care Measurement Option

630 Acquisition Modalities that support the Eye Care Measurement Option SHALL support one or more of the DICOM Measurement Storage SOP Classes that are applicable to EYECARE Acquisition Modalities, such as Lensometry Measurement Storage, Subjective Refraction Measurement Storage, etc., see EYECARE TF-2: 4.2.7 for the complete list of SOP Classes.

The Image Manager/Image Archive and Image Storage/Display Actors that support this option
635 SHALL support all SOP Classes in EYECARE TF-2: 4.2.7.

13.2.2 Patient Record Merging Option

This option allows the Patient Registration Source (i.e., PMS) to control the Patient Registration Consumer (i.e., EHR) to merge patient records when needed. Otherwise, manual steps are required in the DSS/Order Filler to keep the database "clean" and synchronized with the Patient
640 Demographic Source.

It also allows the DSS/Order Filler (i.e., EHR) to control the Image Manager/Image Archive to merge patient records when needed. Otherwise, manual steps are required in the Image Manager/Image Archive to keep the database "clean" and synchronized with DSS/Order Filler.

The Patient Registration Source, Patient Registration Consumer, DSS/Order Filler or Image
645 Manager Archive that supports this option SHALL support the Merge Patient IDs [EYECARE-20] transaction (see EYECARE TF-2: 4.20).

13.2.3 Imaging Procedure Instructions Option

This option allows the health care provider to convey electronic instructions to the technician or photographer who will perform the imaging procedure. For example, there might be instructions
650 to tape the eyelids while performing a visual field or to concentrate on a specific region of the eye during the early stage of an angiogram, etc.

A DSS/Order Filler and Image Manager/Image Archive in Model III SHALL support the NTE optional segment in Procedure Scheduled [EYECARE-21].

655 An Image Manager/Image Archive in Model III or a DSS/Order Filler in Model I and II that supports this option SHALL be able to transmit procedure instructions to an Acquisition Modality or Acquisition Modality Importer in the DICOM Modality Worklist, and the Acquisition Modality or Acquisition Modality Importer displays the instructions to the technician prior to performing the procedure (see EYECARE TF-2: 4.1.6).

13.2.4 Imaging Procedure Status Update (DICOM) Option

660 This option allows the DSS/Order Filler (i.e., EHR) to display the imaging procedure status and signal the doctor that the interpretation should be performed. The imaging procedure status is conveyed by an Acquisition Modality or Acquisition Modality Importer that send DICOM Modality Performed Procedure Step messages to signal the imaging procedure status.

An Acquisition Modality, Acquisition Modality Importer, DSS/Order Filler, or Image
665 Manager/Image Archive that supports this option SHALL support the Modality Procedure Step In Progress [RAD-6] and Modality Procedure Step Completed [EYECARE-6] transactions. See RAD TF-2: 4.6 and EYECARE TF-2: 4.6.

> Note: This option is not applicable to a DSS/Order Filler in Model III since it does not support DICOM Modality Performed Procedure Step.

670 ### 13.2.5 Imaging Procedure Status Update (HL7) Option

This option allows the DSS/Order Filler (i.e., EHR) to display the imaging procedure status and signal the doctor that the interpretation should be performed. The imaging procedure status is conveyed by an Image Manager/Image Archive that sends HL7 messages to signal the imaging procedure status (e.g., images and/or measurements have been archived and are available for
675 interpretation. It also provides an optional ability to for an Image Manager/Image Archive to convey a reference pointer (i.e., URL) to one or more images/measurements.

An Image Manager/Image Archive or DSS/Order Filler that support this option SHALL support the Procedure Status Update [EYECARE-22] transaction.

> Note: This option is not applicable to a DSS/Order Filler in Model II since there is no Image Manager/Image Archive in
680 > that Model to initiate the EYECARE-22 transaction.

13.2.6 Storage Commitment Option

DICOM Storage Commitment enables formal release of storage responsibility from the Acquisition Modality, Acquisition Modality Importer, or Evidence Creator to the Image Manager/Archive, allowing the Modality to reuse its internal resources allocated to the study.

685 The Acquisition Modality, Acquisition Modality Importer, Evidence Creator or Image Manager/Archive that supports this option SHALL support the Storage Commitment [CARD-3] transaction (see CARD TF-2: 4.3).

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13.2.7 Charge Posting Option

690 This option allows the DSS/Order (i.e., EHR) to post charges for both technical and professional charge components to the Charge Processing System (i.e., PMS), using the [EYECARE-17] transaction to convey the charge posting information.

A DSS/Order Filler that supports the Charge Posting Option SHALL support the [EYECARE-17] transaction (see EYECARE TF-2: 4.17).

13.2.7.1 Charge Posting Grouping Requirements

695 A Patient Registration Source Actor that supports the Charge Posting Option SHALL be grouped with a Charge Processor Actor in this profile.

13.2.8 PACS Key Images Sent Option

This option allows the Image Manager/Image Archive to send key images/measurements to an Image Storage/Display (i.e., EHR). It enables the ability for the EHRs to store and display key
700 images/measurements as part of the patient's medical record. It is an option that may be used by an Image Manager/Image Archive in Real World Models I and III, and an EHR with an Image Storage/Display to participate in Model I and III.

The Image Manager/Image Archive and Image Storage/Display that supports this option SHALL support the Modality Images/Evidence Key Objects Stored [EYECARE-18] transaction.

705 ## 13.3 U-EYECARE Actor Groupings

13.3.1 U-EYECARE Required Actor Groupings

An actor from this profile (Column 1) shall implement all of the required transactions and/or content modules in this profile in addition to all of the transactions required for the grouped actor (Column 2).

710 If this is a content profile, and actors from this profile are grouped with actors from a workflow or transport profile, the Content Bindings reference column references any specifications for mapping data from the content module into data elements from the workflow or transport transactions.

In some cases, required groupings are defined as at least one of an enumerated set of possible
715 actors; this is designated by merging column one into a single cell spanning multiple potential grouped actors. Notes are used to highlight this situation.

These groupings apply to all Real World Models.

Note: Requirements for grouping of actors are enumerated in the table below. Implementations must support all of the grouped actors if they support the U-EYECARE Actor listed in column 1. For example, implementations supporting a
720 Patient Registration Consumer (row 4), must support the grouped actors Appointment Consumer, and Department System Scheduler/Order Filler.

Table 13.3-1: U-EYECARE - Required Actor Groupings

U-EYECARE Actor	U-EYECARE Actor to be grouped with
Patient Registration Source (Note 1)	Appointment Scheduler
Appointment Scheduler	Patient Registration Source
Charge Processor	Patient Registration Source
	Appointment Scheduler
Patient Registration Consumer	Appointment Consumer
	Department System Scheduler/Order Filler
Appointment Consumer	Department System Scheduler/Order Filler
	Patient Registration Consumer
Department System Scheduler/Order Filler	Patient Registration Consumer
	Appointment Consumer
Image Storage/Display	Department System Scheduler/Order Filler
	Patient Registration Consumer
	Appointment Consumer
Acquisition Modality	None

U-EYECARE Actor	U-EYECARE Actor to be grouped with
Acquisition Modality Importer	None

Note 1: There are optional groupings specified to support Charge Posting. See Section 13.2.7.

13.3.1.1 Additional U-EYECARE Required Actor Groupings

For Real World Model II, the DSS/Order Filler Actor SHALL be grouped with the Image Storage/Display Actor.

13.4 Unified Eye Care Workflow Process Flow

13.4.1 Patient Registration, Appointment Scheduling, Charge Posting

The Eye Care administrative process relevant to the patient registration, appointment scheduling and the optional charge posting process flow is shown in Figure 13.4.1-1. The functionality of those data flows is specified within the specific transactions invoked by the EYECARE TF.
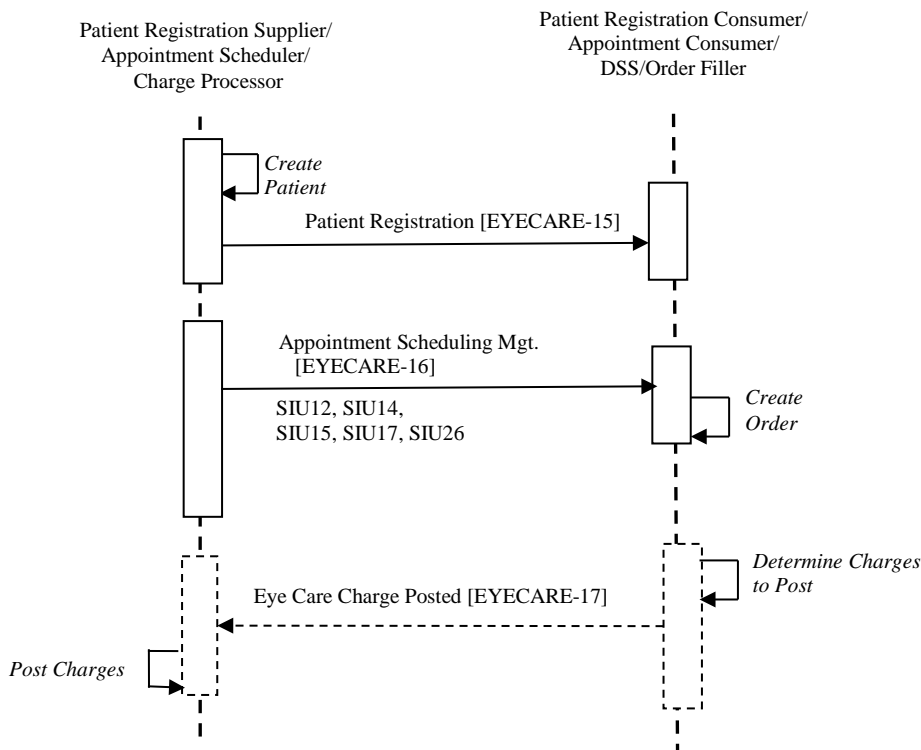
Figure 13.4.1-1: Patient Registration, Appointment Scheduling, Charge Posting Workflow - Administrative Process Flow

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The following should be noted in relation to the Administrative process flow:

- *Patient Registration*: New patient demographics and updates are sent to consuming systems.

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- *Appointment Scheduling*: The patient's appointment is created/managed and sent to consuming systems. This includes new appointments, updates such as confirmed, arrived, checked in, complete. It also supports cancel/delete appointments and patient no shows.

- *Create Order*: The DSS/OF creates patient orders internal to its system.

- *Charge Posted*: The DSS/Order Filler provides charging information to the Charge

745 Processor and the Charge Processor post the charges.

13.4.2 Real World Model I - EHR Supports DICOM Worklist and Integrated with a PACS

Real World Model I addresses a scenario where organizations have a Practice Management System (PMS), Electronic Health Record System (EHR), centralized Image Archive, Image

750 Display (PACS) and eye care diagnostic imaging and testing equipment (fundus cameras, slit lamps, refractive measurement devices, visual fields etc.).

The Eye Care administrative process flow relevant to the scenario were the DSS/Order Filler (i.e., typically an EHR) supports DICOM worklist and is integrated with an Image Manager/Image Archive (i.e., typically a PACS). The process flow is shown in Figure 13.4.2-1.

755 The functionality of those data flows is specified within the specific transactions.

Figure 13.4.2-1: Real World Model I - Administrative Process Flow

760 • *Patient Registration*: New patient demographics and updates are sent to consuming systems.

• *Appointment Scheduling*: The patient's appointment is created/managed and sent to consuming systems. This includes new appointments, updates such as confirmed, arrived, checked in, complete. It also supports cancel/delete appointments and patient no shows.

765 • *Create Order*: The DSS/OF creates patient orders internal to its system.

- *Scheduled Procedure*: The DSS/OF associates the order with one or more Requested Procedures that have to be performed to satisfy the order. Each Requested Procedure prescribes a number of actions that have to be performed by Acquisition Modalities and Acquisition Modality Importers. Actions are specified in Scheduled Procedure Steps (SPS) based on timing and sequencing, and on modality. Scheduled Procedure Steps are scheduled, i.e., assigned a time slot and performing resource (modality), and are made available for Modality Worklist Query.

- *Query Modality Worklist*: The Modality Worklist (MWL) query may be broad (get a list of scheduled procedures from which one will be selected), or patient-specific (provided with sufficient query keys to get back the scheduled procedure for a single patient). Eye Care procedures may be performed on multiple Acquisition Modalities or Acquisition Modality Importers; therefore, multiple devices may perform the queries.

- *Select Patient*: The patient is selected from the worklist.

- *Perform Acquisition*: Each Modality may produce a variety of images and other evidence (visual fields, refractive and biometry information, etc.). The DICOM SOP instances are stored to the Image Manager/Image Archive.

13.4.3 Real World Model II - EHR Supports DICOM Worklist, Image Storage and Display (With no PACS)

Real World Model II addresses a scenario where organizations have a Practice Management System (PMS), Electronic Health Record System (EHR) and eye care diagnostic imaging and testing equipment (fundus cameras, slit lamps, refractive measurement devices, visual fields etc.). The EHR performs the storage (not archive) and display of DICOM images, measurements, etc.

The Eye Care administrative process flow relevant to the scenario were the DSS/Order Filler (i.e., typically an EHR) supports DICOM worklist, image storage and display. The process flow is shown in Figure 13.4.3-1. The functionality of those data flows is specified within the specific transactions.

795

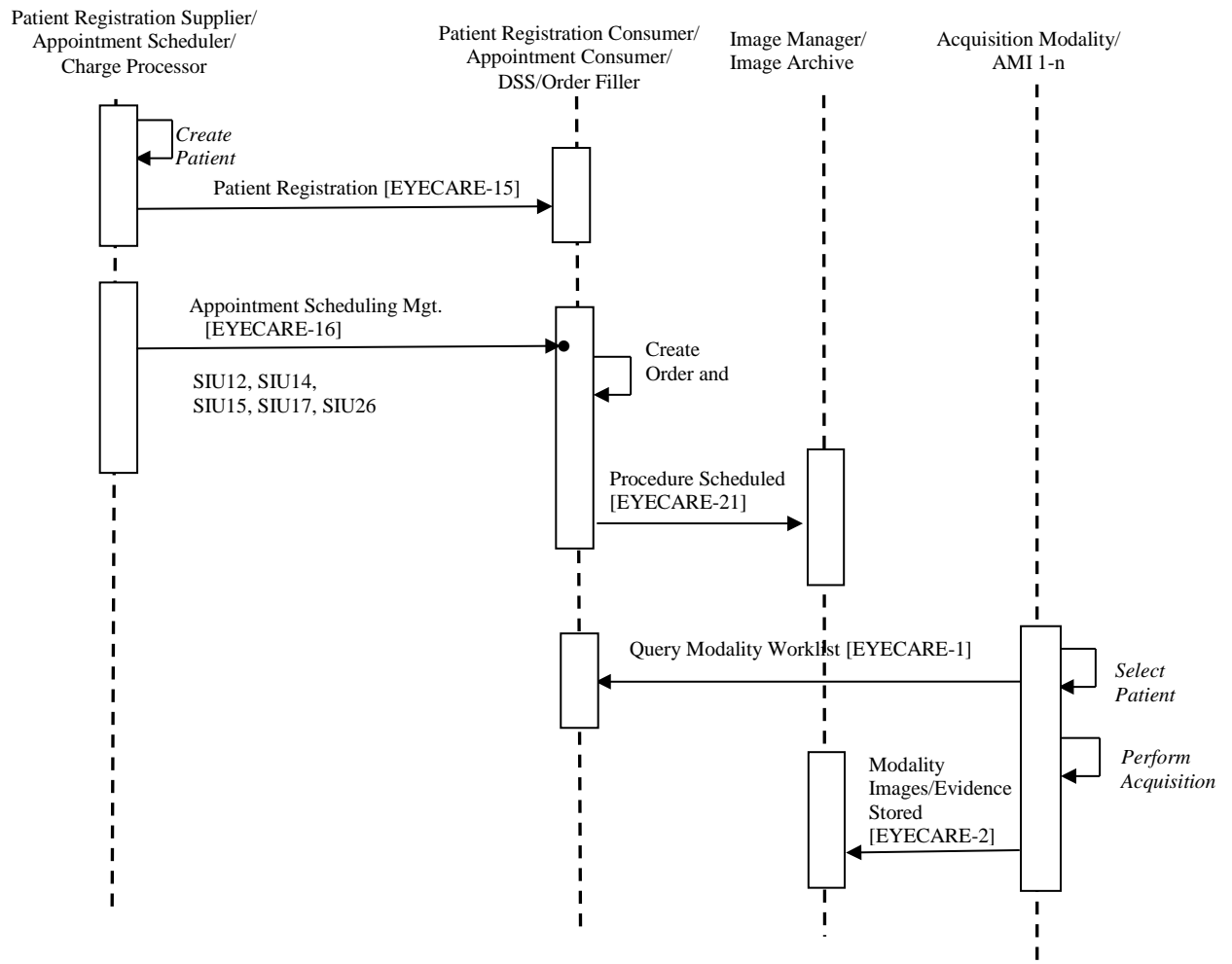**Figure 13.4.3-1: Real World Model II - Administrative Process Flow**

- *Patient Registration*: New patient demographics and updates are sent to consuming systems.

800
- *Appointment Scheduling*: The patient's appointment is created/managed and sent to consuming systems. This includes new appointments, updates such as confirmed, arrived, checked in, complete. It also supports cancel/delete appointments and patient no shows.

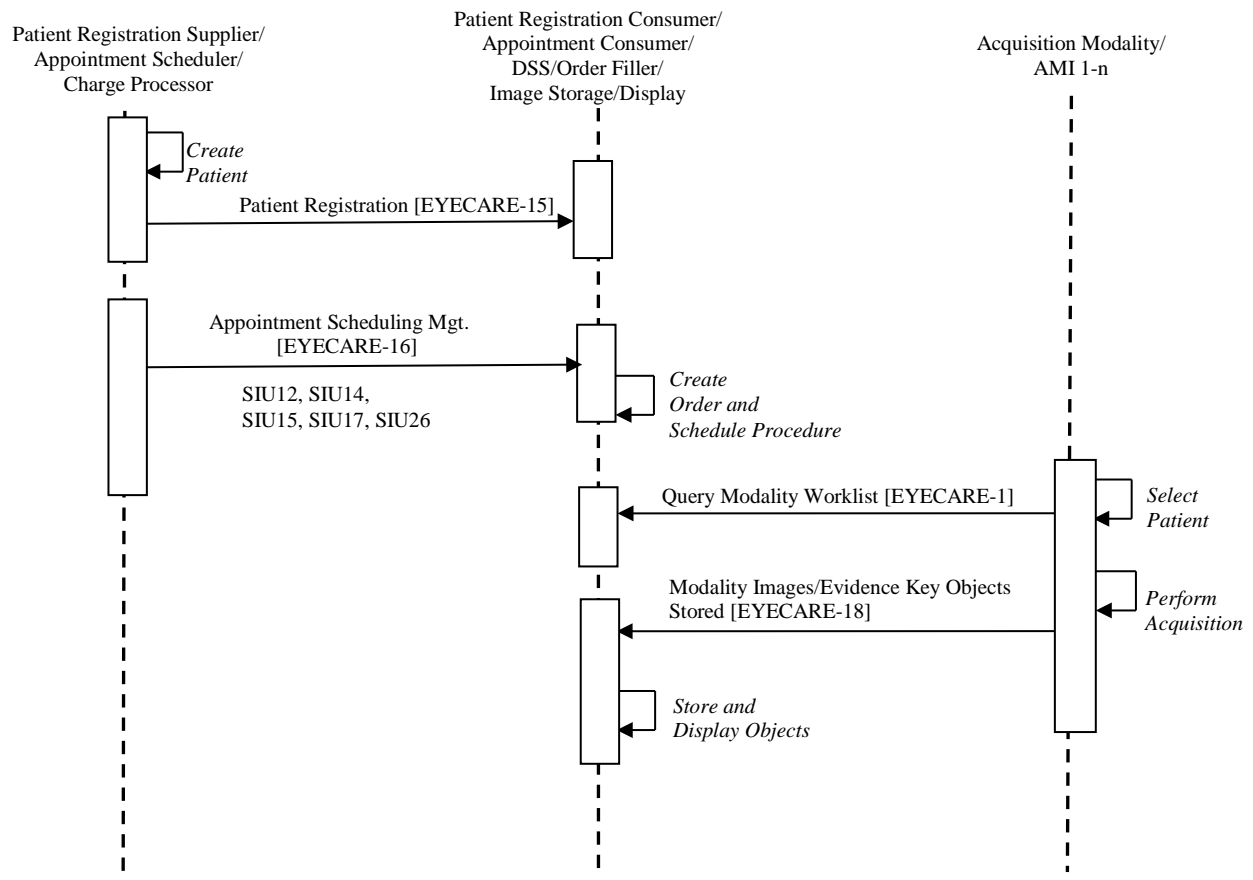- *Create Order*: The DSS/OF creates patient orders internal to its system.

- *Scheduled Procedure*: The DSS/OF associates the order with one or more Requested
805   Procedures that have to be performed to satisfy the order. Each Requested Procedure prescribes a number of actions that have to be performed by Acquisition Modalities and

Acquisition Modality Importers. Actions are specified in Scheduled Procedure Steps (SPS) based on timing and sequencing, and on modality. Scheduled Procedure Steps are scheduled, i.e., assigned a time slot and performing resource (modality), and are made available for Modality Worklist Query.

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- *Query Modality Worklist*: The Modality Worklist (MWL) query may be broad (get a list of scheduled procedures from which one will be selected), or patient-specific (provided with sufficient query keys to get back the scheduled procedure for a single patient). Eye Care procedures may be performed on multiple Acquisition Modalities or Acquisition Modality Importers, therefore, multiple devices may perform the queries.

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- *Select Patient*: The patient is selected from the worklist.

- *Perform Acquisition*: Each Modality may produce a variety of images and other evidence (visual fields, refractive and biometry information, etc.). The key DICOM SOP instances are selected and stored to the Image Storage/Display. The Image Storage/Display is highly recommended to support all the object types as specified by the Eye Care Image Option, the Eye Care Measurement Option and the Encapsulated PDF Option (see EYECARE TF-2: 4.2).

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- *Store and Display Objects*: The Image Storage/Display Actor stores the DICOM SOP Instances and is able to display them to the user of the system.

13.4.4 Real World Model III - EHR Implements HL7 Only (no DICOM support) and Integrated with a PACS

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Real World Model III addresses a scenario where organizations have a Practice Management System (PMS), Electronic Health Record System (EHR), centralized Image Archive, Image Display (PACS) and eye care diagnostic imaging and testing equipment (fundus cameras, slit lamps, refractive measurement devices, visual fields, etc.).

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The Eye Care administrative process flow relevant to the scenario were the DSS/Order Filler (i.e., typically an EHR) does not support DICOM transactions (i.e., HL7 messages only), therefore the Image Manager/Image Archive supports DICOM worklist. The process flow is shown in Figure 13.4.4-1. The functionality of those data flows is specified within the specific transactions.

835
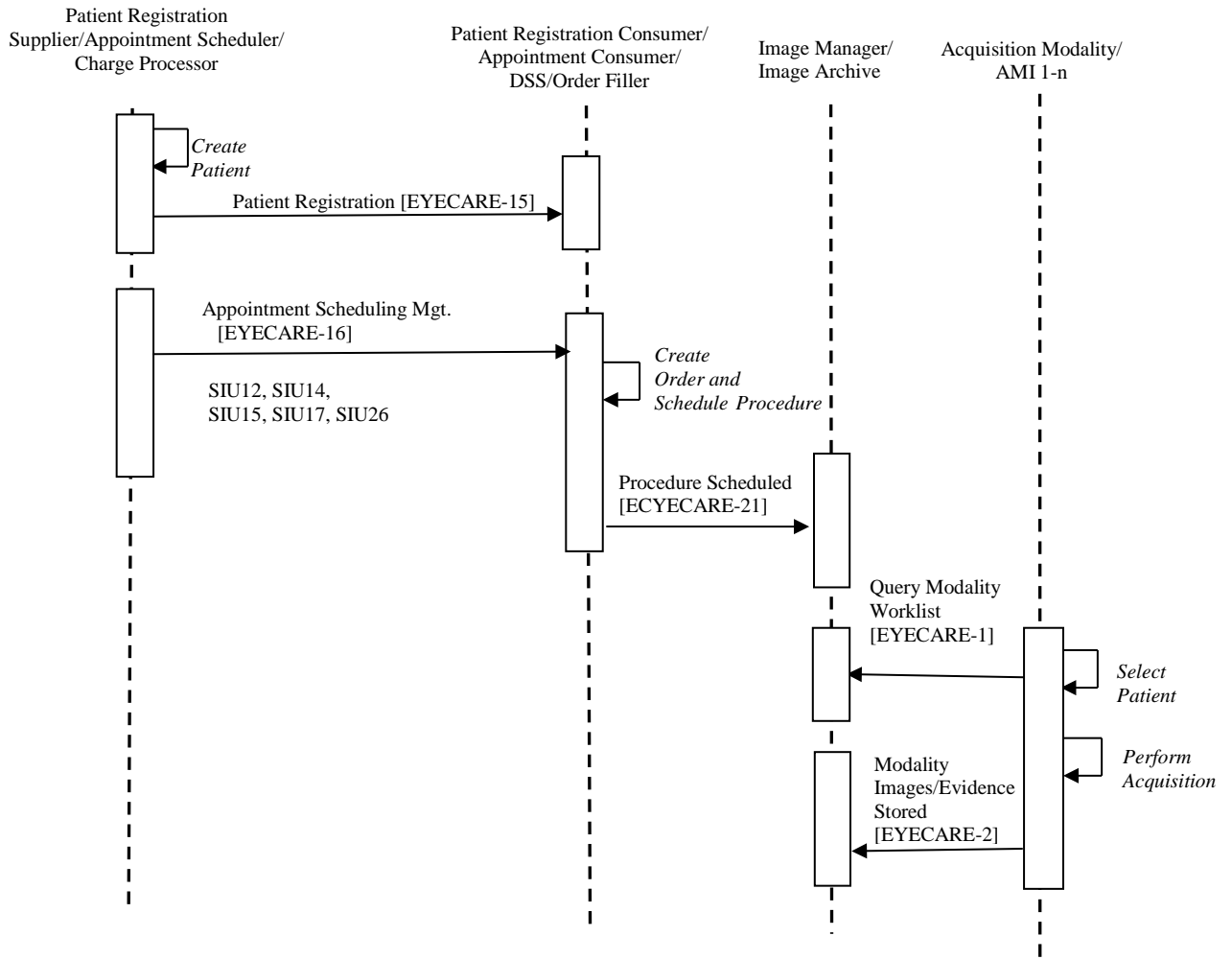
Figure 13.4.4-1: Real World Model III - Administrative Process Flow

840
- *Patient Registration*: New patient demographics and updates are sent to consuming systems.

- *Appointment Scheduling*: The patient's appointment is created/managed and sent to consuming systems. This includes new appointments, updates such as confirmed, arrived, checked in, complete. It also supports cancel/delete appointments and patient no shows.

845
- *Create Order*: The DSS/OF creates patient orders internal to its system.

- *Scheduled Procedure*: The Image Manager/Image Archive associates the order with one or more Requested Procedures that have to be performed to satisfy the order. Each

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Requested Procedure prescribes a number of actions that have to be performed by Acquisition Modalities and Acquisition Modality Importers. Actions are specified in Scheduled Procedure Steps (SPS) based on timing and sequencing, and on modality. Scheduled Procedure Steps are scheduled, i.e., assigned a time slot and performing resource (modality), and are made available for Modality Worklist Query.

- *Query Modality Worklist*: The Modality Worklist (MWL) query may be broad (get a list of scheduled procedures from which one will be selected), or patient-specific (provided

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with sufficient query keys to get back the scheduled procedure for a single patient). Eye Care procedures may be performed on multiple Acquisition Modalities or Acquisition Modality Importers, therefore, multiple devices may perform the queries.

- *Select Patient*: The patient is selected from the worklist.

- *Perform Acquisition*: Each Modality may produce a variety of images and other evidence

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(visual fields, refractive and biometry information, etc.). The DICOM SOP instances are stored to the Image Manager/Image Archive.

13.4.5 DICOM Storage Commitment and DICOM MPPS Support

The Eye Care administrative process flow relevant to the scenario where the DICOM transactions such as Storage Commitment and Modality Performed Procedure Step are supported

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is shown in Figure 13.4.5-1. The patient registration, appointment scheduled, procedure scheduled, modality worklist process flows are omitted as they have been shown above. The functionality of those data flows is specified within the specific transactions.
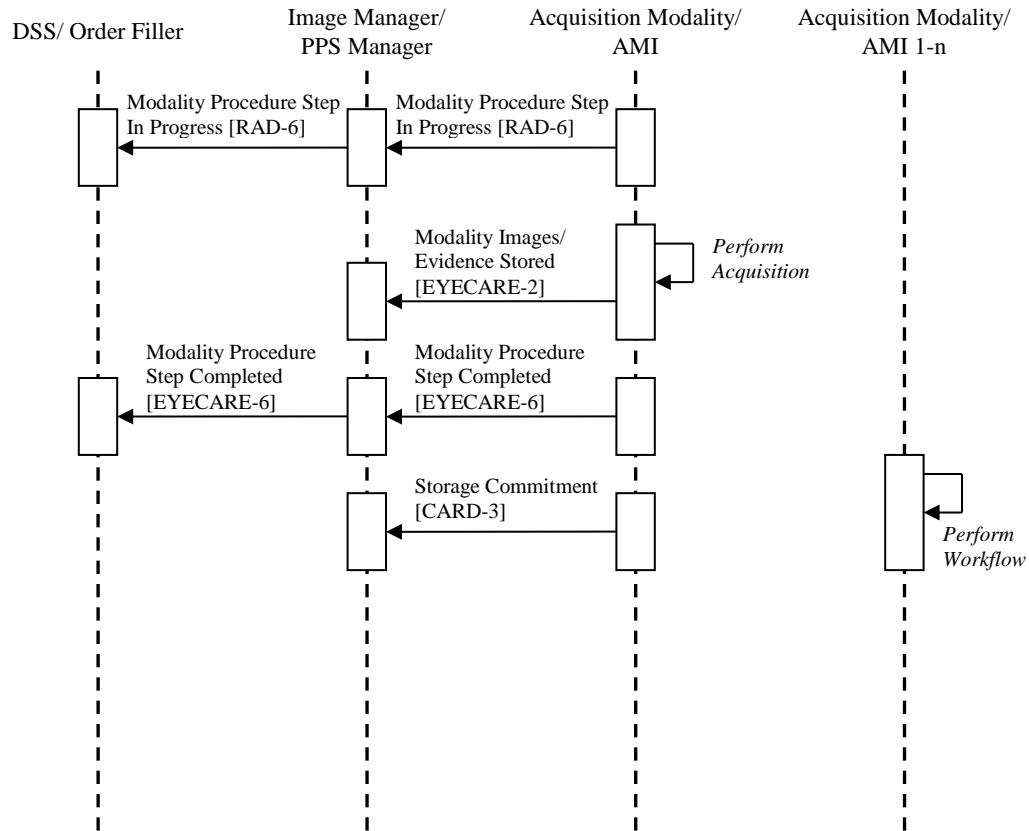
870

Figure 13.4.5-1: DICOM Storage Commitment and DICOM MPPS Support - Administrative Process Flow

- *Modality Procedure Step In Progress:* This allows the Acquisition Modalities and Acquisition Modality Importers to specify that they have started the procedure step and
875 which is linked to the information provided in the Query Modality Worklist transaction.

- *Perform Acquisition*: Each Modality may produce a variety of images and other evidence (visual fields, refractive and biometry information, etc.) that are stored to the Image Manager/Archive. The Image Manager/Archive must support all the object types as specified by the Eye Care Image Option, the Eye Care Measurement Option and the
880 Encapsulated PDF Option (see EYECARE TF-2: 4.2).

- *Modality Procedure Step Complete* and *End Procedure*: Modality Procedure Step Complete also includes Modality Procedure Step Discontinued. The simple transmission of a Complete or Discontinued does not indicate that an Acquisition Modality or Acquisition Modality Importer is then available, due to multi-step procedures (diagnostic

885   images, evidence documents) and multi-modality cross-dependencies. It is a function of the DSS/OF (outside the scope of this profile) to determine when to end the procedure step, and declare the Acquisition Modality or Acquisition Modality Importer resources are available for another procedure step. As part of this transaction, [EYECARE-6] (an extension to [RAD-7]) requires the Acquisition Modality or Acquisition Modality

890   Importer accurately convey the Performed Protocol Code Sequence. This requirement enables the ability to create automatic billing claims for products implementing the *Charge Posting Integration Profile*.

- *Storage Commitment:* The Image Manager/Archive accepts responsibility for stored images and evidence, allowing the Acquisition Modality or Acquisition Modality

895   Importer to delete the data from its local storage. The Image Manager/Archive shall support devices that may be intermittently connected to the network and temporarily unable to receive Storage Commitment messages. If Storage Commitment fails, the Acquisition Modality or AMI may need to resend the images to the Image Manager/Image Archive.

900   ## 13.4.6 Extension to Query Modality Worklist for Eye Care [EYECARE-1]

13.4.6.1 Issuer of Patient ID

The Patient Registration Supplier Actor transmits information regarding the assigning authority (issuer) of the Patient ID to the Patient Registration Consumer/DSS/OF Actor. However, [RAD-5] (see RAD TF-2: 4.5), does not require the DICOM attribute "Issuer of Patient ID" be filled in

905   by the DSS/OF Actor if asked by the Acquisition Modality or Acquisition Modality Importer (AMI) during a Modality Worklist query. This extension requires support for this attribute; see IHE EYECARE TF-2: 4.1.5 for complete specifications.

A key feature in Eye Care is that patient identity is a critical issue for the Acquisition Modality itself, because of longitudinal data requirements. For example, visual field analyzers persistently

910   store longitudinal data in order to perform glaucoma progression analysis. Ensuring that all the data comes from one patient, and that all data from that patient is used to calculate the progression, is essential.

Traditionally, many instruments have used the patient name and date of birth to determine the identity of patient records because Patient IDs were not available from an electronic health

915   record and were unreliable. As electronic health record systems become available to manage patient IDs systematically, these are typically used as the unique key for the identity of the patient record; however, this is within the context of their own "namespace" of IDs. In order for an acquisition modality to confidently determine the identity of its patient records based on the Patient ID, it also must know this context. This can be provided by the "Issuer of Patient ID"

920   attribute.

Note: When an Issuer of ID is provided to the acquisition modality, it should determine patient identity based on the (Issuer of Patient ID, Patient ID) combination, rather than patient name and date of birth. The acquisition modality should still provide patient reconciliation logic for legacy records.

13.5 Unified Eye Care Workflow Use Cases

925 This section describes the specific use cases and process flows defined for the Unified Eye Care Workflow Profile.

Clinical Context: U-EYECARE typically addresses workflow scenarios for an ambulatory eye care clinic.

We are addressing scenarios expecting the patients to be registered, an appointment scheduled
930 (and updated), eye care procedure(s) are ordered and diagnostic imaging/measurements are generated. The following two examples show two typical scheduled workflows that may occur. They are very similar in the IHE transactions performed; however, the difference is whether a manual or automatic order was created for a procedure.

Note: For the purposes of the Eye Care Technical Framework, the term "order" is to be construed in the most generic sense.
935 The extent to which an order is treated as a healthcare provider's order is to be a function of legal jurisdiction. When the procedure involved is deemed not to require a healthcare provider's order, the "order" may be viewed simply as a requirement to preserve data integrity in the workflow.

13.5.1 Workflow Example with Manual Procedure Order

The patient has been created in a Patient Registration Supplier Actor, a healthcare provider has
940 written a procedure order manually and a procedure step has been scheduled in the DSS/OF. The technician uses the Acquisition Modality or Acquisition Modality Importer to query for a worklist. This may be either a patient query (using parameters to identify the patient uniquely), or a broad query (for all procedure steps scheduled for the modality). The modalities use the DICOM modality worklist service to query the DSS/OF or Image Manager/Image Archive,
945 which responds with a worklist. This is displayed on the modality. The modality may then use the DICOM query/retrieve service to retrieve longitudinal data to display to the technician prior to the acquisition, or to display to the healthcare provider after the acquisition (for implicit post-processing involving longitudinal data).The technician selects the appropriate worklist item The technician performs the acquisition based upon the scheduled protocol code identified in the
950 worklist, or the technician may determine that the requested protocol code was insufficiently specific, and select a different code for acquiring the information. For example, a visual field may have been ordered and the code to convey the procedure and protocol is Visual Field. This code is not specific enough to choose the algorithm needed. Management of the performed procedure step is an optional feature (DICOM MPPS) in U-EYECARE; see 3.4.1 for
955 explanation.

13.5.1 Workflow Where the Procedure Ordered is an Automatic Eye Care Order

There are often a number of procedures performed on patients when they arrive in the clinic, without need for healthcare provider orders. For example, an eye care order may be created automatically when a patient is scheduled for an eye exam, placing the patient's name and order information on the modality worklist of several different instruments in the eye care clinic. Examples may include a lensometer and an autorefractor, etc. In this scenario, not all of the orders are performed. For example, if the patient does not have glasses, no lensometry measurement is required.

The patient has been created in a Patient Registration Supplier Actor, and a number of automatic orders are generated by the DSS/OF (i.e., an automatic eye care order is created) and sent to the Image Manager/Image Archive using the Procedure Scheduled transaction. The technician uses the Acquisition Modality or Acquisition Modality Importer Actor to query the DSS/OF or Image Manager/Image Archive for a worklist. This may be either a patient query (using parameters to uniquely identify the patient), or a broad query (for all procedure steps scheduled for the modality). This is displayed on the Acquisition Modality or Acquisition Modality Importer. At this time, the technician recognizes the automatic eye care order and therefore determines that he/she needs to select the appropriate protocol code and perform the acquisition. The technician performs an acquisition for the patient. When the technician selects to save the acquisition, the modality uses the DICOM storage service to store the acquisition data to the storage server. Additional acquisitions may occur as part of the performed procedure step, each resulting in a DICOM storage command. Management of the performed procedure step is an option in U-EYECARE; see Section 3.4.2 for explanation (from A-EYECARE)..

Not all of the automatically generated orders will be performed. The DSS/OF and/or Image Manager/Image Archive is responsible to remove all unused worklist items that have not been performed on this patient. The triggering mechanism for removing these automatic orders from the device specific Acquisition Modality Worklist will be defined by the DSS/OF and/or Image Manager/Image Archive and configured for the specific needs of the clinic. This is outside the scope of IHE.

The above workflow may occur on many different modalities for which automatic orders were created in the clinic.

This scenario is more completely documented in Appendix A.3 Workflow Examples using Automatic Orders.

13.6 Workflow Concepts in Practice

The IHE "Real World" model for Workflow described above offers three major levels of control that can be used to customize a broad range of specific workflow situations:

- **Order**: A request for an Imaging Service

- **Requested Procedure**: Unit of work resulting in one report with associated codified, billable acts.

995 - **Scheduled and Performed Procedure Step**: the smallest unit of work in the workflow that is scheduled (work to do) and/or performed (work done).

The DSS/OF uses the Universal Service ID in each order that it receives to determine what specific Requested Procedures are needed, and for each Requested Procedure, what Procedure Steps need to be scheduled.

1000 A departmental Procedure Plan may be used in the DSS/OF Actor to predefine Orders that may be requested from the eye care department. Definitions will specify both the procedure code and the Scheduled Procedure Steps for each Requested Procedure.

The figure below defines an example of the breakdown of a "rule out glaucoma" Order.
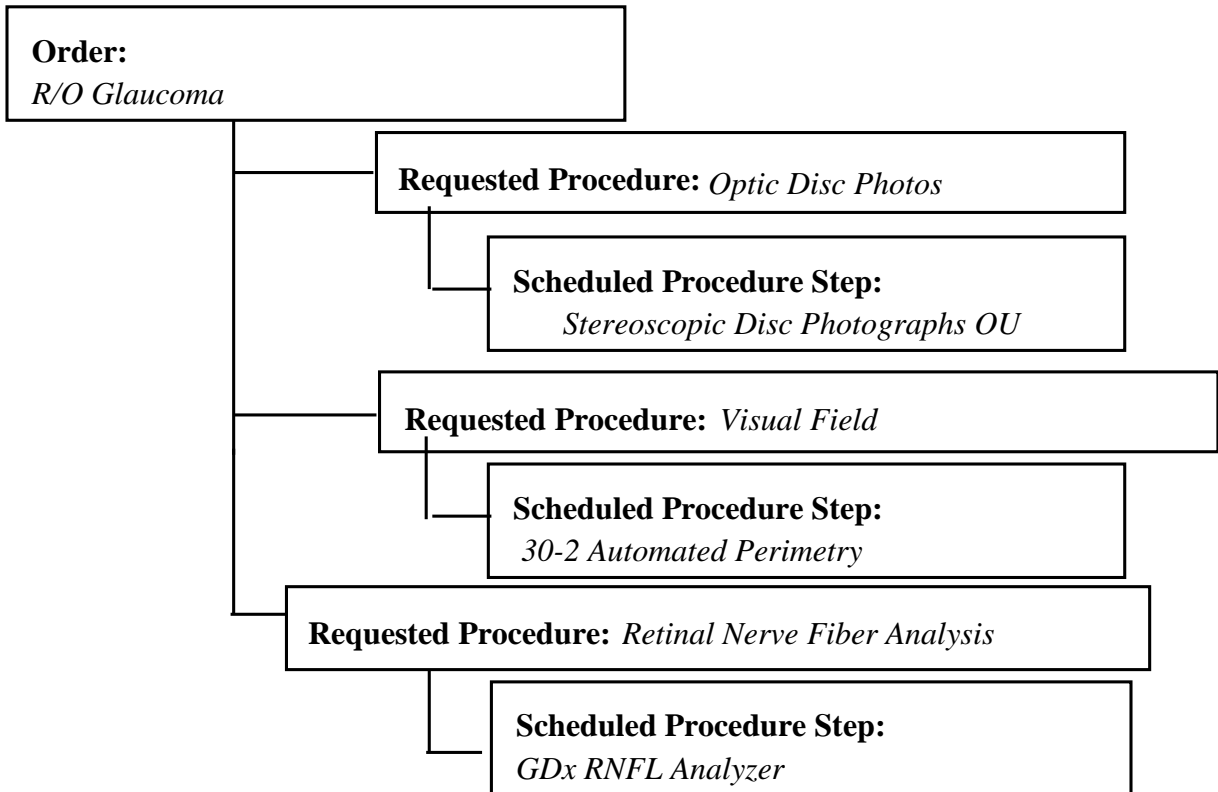
1005 In this Procedure Plan, for this specific Order, three Requested Procedures are defined. Each Requested Procedure has been scheduled as a separate Scheduled Procedure Step, because the patient may have each one performed at a different time. In addition, more than one ophthalmologist may be involved in the interpretation of the Requested Procedures. This is the

1010 way this institution has decided to handle this Order. Another Institution may choose to require the same ophthalmologist to read some or all of the procedures. In that case, its Procedure Plan would define same Order to have a single Requested Procedure with two or three Scheduled Procedure Steps.

Many Orders processed in an Eye Care Department would have a simpler breakdown such as this Optic Disc Photos example.

Order :
Optic Disc Photos

Requested Procedure :
Stereoscopic Disc Photographs OU

Scheduled Procedure Step :
Stereoscopic Disc Photographs OU
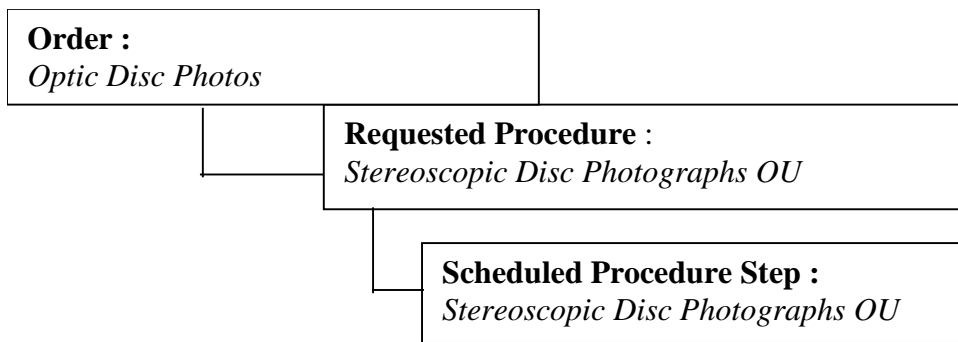
1015

Note that the three level Order breakdown has been defined in the IHE Radiology Scheduled Workflow so that any type of Order, from the simple case to the more complex case may be handled by the same workflow concepts; thus, providing a general approach that can be easily customized by each department in the definition of its Procedure Plan.

1020 In the IHE Radiology Scheduled Workflow, the **Accession Number identifies the Order**. The **Requested Procedure ID** distinguishes among Requested Procedures when an Order requires multiple Procedures. IHE sets a common meaning for these two terms to provide healthcare providers with a consistent and non-ambiguous access across different vendor products (RIS, PACS and Modalities).

1025 Management of the performed procedure step is optional in U-EYECARE; see EYECARE TF-1: 3.5 in the A-EYECARE Profile for explanation.

13.7 Patient Record Merging Use Case

Clinical Context: Jane Smith is a patient within an eye care clinic. She gets married and her name has been changed to Jane Brown. Her medical records, images, measurements, etc. need 1030 updating to reflect her new patient demographics and/or patient ID. Products typically affected include Practice Management Systems (PMS) and Electronic Medical Record systems. The PMS is manually reconciled and the other systems are automatically synchronized with the patient name/demographics changes.

As part of the reconciliation of the two patient records, the Patient IDs (i.e., records) need to be 1035 merged. Merge Patient IDs [EYECARE-20] is an optional transaction that requires support of HL7 ADT-40 (Merge Patient ID) to accomplish the merge. This is an advanced feature that is not easy to accomplish, therefore, if [EYECARE-20] is not supported it is expected that systems

will manually merge the patients internally in each system. How this is accomplished is outside the scope of IHE.

1040 **IHE Context:** This use case includes the Patient Registration transaction (HL7 A08); this transaction synchronizes patient demographics of the Patient Registration Supplier and Patient Registration Consumer. Followed by the Patient Demographics Update transaction (HL7 A08); this transaction synchronizes patient demographics of the DSS/Order Filler with the Image Manager/Image Archive. The transaction Merge Patient IDs [EYECARE-20] is an optional

1045 transaction which may be supported by all actors; this option is not shown.

The figure below provides an example workflow for the merging a patient's records and assumes Jane Smith has already been registered; such as in Figure 13.7-1.
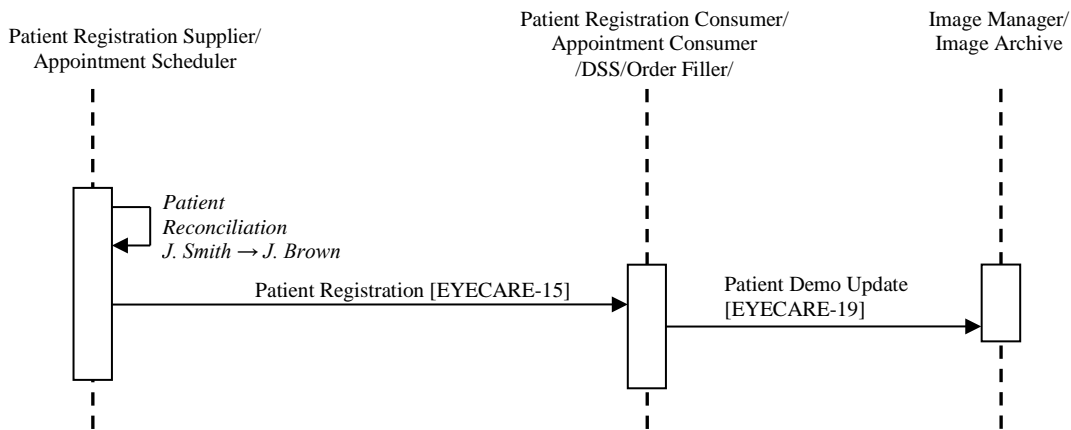
1050

Figure 13.7-1: Patient Record Merging

The above example illustrates how the HL7 ADT A08 message is used to reconcile patient demographics. It is also used to convey additional information or changes to patient information,

1055 such as address changes, phone number changes, insurance updates, etc.

13.8 Unified Eye Care Workflow Security Considerations

No security considerations are required.

13.9 Unified Eye Care Cross-Profile Considerations

Implementations that support U-EYECARE may also support actors/transactions and/or options

1060 defined in A-EYECARE, B-EYECARE and/or C-EYECARE.

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Glossary

No terms added to glossary.

1065

Volume 2 – Transactions

Modify Section 4.1 to include Image Manager/Image Archive Actor and update the Imaging Procedure Instructions Option

4.1 Query Modality Worklist [EYECARE-1]

1070   This transaction is identical to Query Modality Worklist [RAD-5] (see RAD-TF 2: 4.5), with the addition of some features.

> Note-1: The Radiology TF requires that the Acquisition Modality support at least one of the Worklist Query choices (i.e., Patient and/or Broad). Eye Care requires support for both options for both the Acquisition Modality and Acquisition Modality Importer. See EYECARE-TF 1:3.2.

1075   ### 4.1.1 Scope

This transaction takes place at the Acquisition Modality or the Acquisition Modality Importer (AMI) at the point of scan/acquisition. When a patient arrives for the scheduled procedure, the user performing the procedure must examine key information elements as they relate to the procedure, the correctness of the procedure that has been ordered, and comments that may have
1080   been entered by the referring healthcare provider. The user at the Acquisition Modality or the Acquisition Modality Importer uses the DICOM Modality Worklist to query the Department System Scheduler/Order Filler **or Image Manager/Image Archive** for Scheduled Procedure Steps. The list is downloaded to the modality and the user verifies the information on the modality console. In the Modality/Evidence Images Stored transaction this information will be
1085   included in the header of the generated objects (see RAD-TF 2: 4.8 and RAD-TF 2: Appendix A).

4.1.2 Use Case Roles
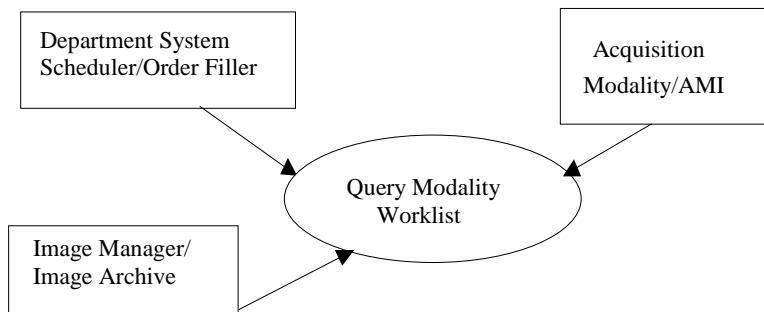
1090   **Actor:** Acquisition Modality and Acquisition Modality Importer

Role: Responsible for requesting and receiving data from the Department System Scheduler/Order Filler **or Image Manager/Image Archive**, with the ability to validate the data and correct some discrepancies.

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Actor: Department System Scheduler/Order Filler **or Image Manager/Image Archive**

1095 **Role:** Responsible for accepting requests for MWL from an Acquisition Modality or Acquisition Modality Importer, performing the query, and sending the response back.

4.1.3 Referenced Standards

DICOM PS 3.4: Modality Worklist SOP Class

4.1.4 Interaction Diagram

1100
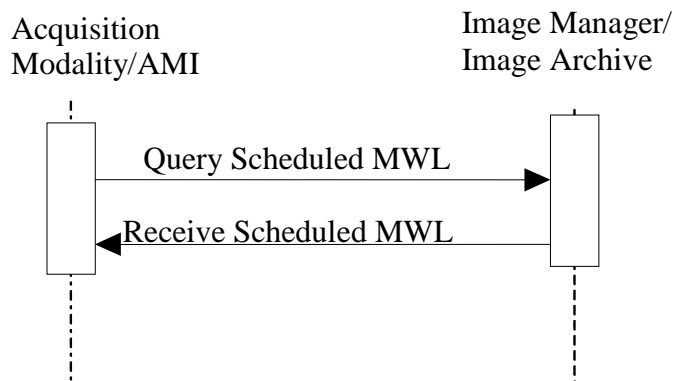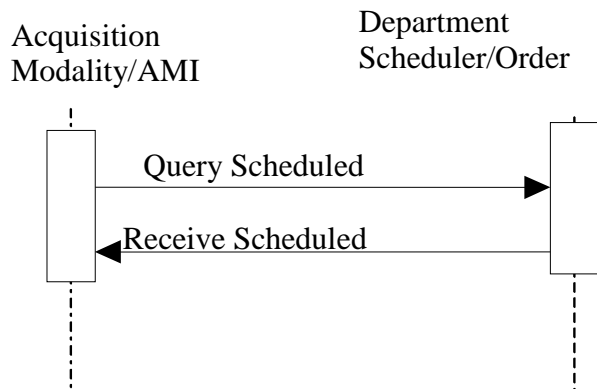
1105 **4.1.4.1 Query Scheduled MWL Message**

This is the worklist query message sent to the Department System Scheduler/Order Filler **or Image Manager/Image Archive**.

4.1.4.1.1 Trigger Events

The patient arrives at the modality for a procedure.

4.1.4.1.2 Message Semantics

The Acquisition Modality or Acquisition Modality Importer uses the C-FIND Request of the DICOM Modality Worklist SOP Class to query for the worklist from the Department System Scheduler/Order Filler (DSS/Order Filler) **or Image Manager/Image Archive**. The Acquisition Modality or Acquisition Modality Importer performs the SCU role, and the DSS/Order Filler performs the SCP role. The types of queries specified are defined in the RAD-TF 2: 4.5.

4.1.4.1.3 Expected Actions

The expected actions are defined in RAD-TF 2: 4.5. This section provides some further explanation for one eye care use case.

Various types of acquisition devices are able to create ophthalmic photography images and/or ophthalmic tomography images. For example, both fundus cameras and slit-lamp biomicroscopes are able to create ophthalmic photography images. When performing Modality Worklist clinics may desire to schedule protocols for each device separately (i.e., see a separate list for the fundus and slit-lamp biomicroscopes). This use case is solved in most specialties by using the Modality attribute in the MWL query; however, since the modality for each device is OP, this does not satisfy the use case in eye care. The solution to this use case is the DSS/OF **or Image Manager/Image Archive** managing the attribute Scheduled Station AE Title.

The Scheduled Station AE Title attribute is used to determine the actual device asking the MWL query. If the clinic wishes to schedule each device separately, then the Scheduled AE Title is used to distinguish between devices. However, this is not a very common case and more common is when a clinic wishes to schedule based upon device type. For this scenario, the DSS/OF **or Image Manager/Image Archive** provides the solution by creating a table of AE Titles for each type of similar device. Therefore, when the fundus camera and slit-lamp biomicroscope acquisition modalities use Scheduled Station AE Title in their MWL query, they will each receive a different list of scheduled procedures. This is just one scenario for how the DSS/OF **or Image Manager/Image Archive** should manage the attribute Scheduled Station AE Title. Others may also be required based upon the needs of the clinic.

4.1.5 Issuer of Patient ID

The ADT/Patient Registration Actor transmits information regarding the assigning authority (issuer) of the Patient ID to the DSS/Order Filler **or Image Manager/Image Archive** Actor; this is defined in [RAD-1] (see RAD TF-2: 4.1). However, [RAD-5] (see RAD-TF 2: 4.5) does not required the DICOM attribute "Issuer of Patient ID" be filled in by the DSS/Order Filler Actor if asked by the Acquisition Modality or Acquisition Modality Importer during a Modality Worklist

query. This extension requires support for this attribute. See EYECARE-TF 1: 3.3.1 for use case explanation.

1145 For this EYECARE-1 extension, Table 4.5-3 from [RAD-5] (see RAD-TF 2: 4.5) shall be extended as defined by the following table entry.

Table 4.1.5-1: Return and Matching Keys For Modality Worklist

Attribute Name	Tag	Query Keys Matching		Query Keys Return	
		SCU	SCP	SCU	SCP
Patient Identification					
Issuer of Patient ID	(0010,021)	O	O	O	R+

1150 Note: The Acquisition Modality and Acquisition Modality Importer are not required to ask for the Issuer of Patient ID in their queries; however, if they do ask for the attribute, the DSS/Order Filler **or Image Manager/Image Archive** is required to return a valid value in the response.

4.1.6 Imaging Procedure Instructions Option

When an order for a procedure is created, a health care provider may wish to include instructions to the technician. For example there might be instructions to tape the eyelids while performing a
1155 visual field or to concentrate on a specific region of the eye during the early stage of an angiogram, etc.

This ~~is~~ **can be** accomplished **via various workflows, such as:**

- ~~w~~ **W**hen an Order Placer and/or DSS/Order Filler Actor transmits HL7 ORM messages which are defined in [EYECARE-10] and [EYECARE-11], see **EYECARE-TF 2:**
1160 **Section** 4.10 and ~~EYECARE-TF 2:~~ **Section** 4.11 for complete specifications.

- **When a DSS/Order Filler Actor in Model I and II generates an internal order and captures procedure instructions.**

- **When a DSS/Order Filler Actor in Model III generates an internal order, captures procedure instructions and provides the instructions in the NTE optional segment in**
1165 **Procedure Scheduled [EYECARE-21] transaction to the Image Manager/Image Archive.**

If instructions for a procedure are provided, the DSS/OF **or Image Manager/Image Archive Actor that supports that supports the Imaging Procedure Instructions Option** shall convey these instructions to the Acquisition Modality or Acquisition Modality Importer during a
1170 Modality Worklist query using the DICOM attribute "Requested Procedure Comments". The Acquisition Modality and/or Acquisition Modality Importer Actors shall display the instructions to the technician prior to performing the procedure.

Table 4.1.6-1: Return and Matching Keys for Modality Worklist

Attribute Name	Tag	Query Keys Matching		Query Keys Return	
		SCU	SCP	SCU	SCP
Requested Procedure Comments					
Requested Procedure Comments	(0040,1400)	O	O	R+	R+

1175

Add new Section 4.18

4.18 Modality Images/Evidence Key Objects Stored [EYECARE-18]

This transaction is identical to Modality Images/Evidence Stored [EYECARE-2] (see Section
1180 4.2) except for the behavior requirements of the systems transmitting and receiving the
images/evidence objects. The behavior is based upon requirements where the images/evidence
objects are NOT stored on an image archive system and therefore only key objects are
transmitted.

4.18.1 Scope

1185 In the Modality Images/Evidence Key Objects Stored transaction, the Acquisition Modality or
Acquisition Modality Importer is able to select and send key image/evidence objects to the
Image Storage/Display. The information provided from the Modality Worklist transaction (see
RAD TF-2: 4.5) SHALL be included in the headers of the generated images.

4.18.2 Use Case Roles
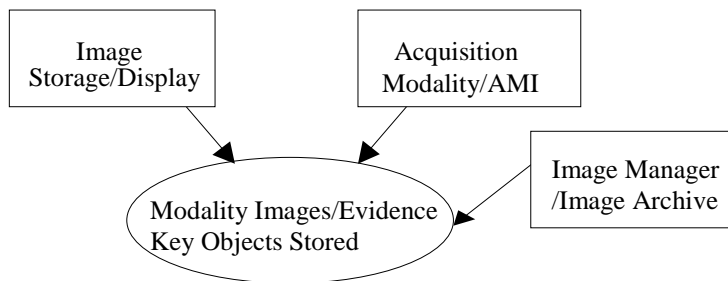
1190

Actor: Acquisition Modality, Acquisition Modality Importer or Image Manager/Image Archive

Role: Transmit key selected image/evidence objects

Actor: Image Storage/Display

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57

Role: Accept and store images/evidence objects

4.18.3 Referenced Standards

DICOM 2015 PS 3.4: Storage Service Class.

4.18.3.1 Interaction Diagram
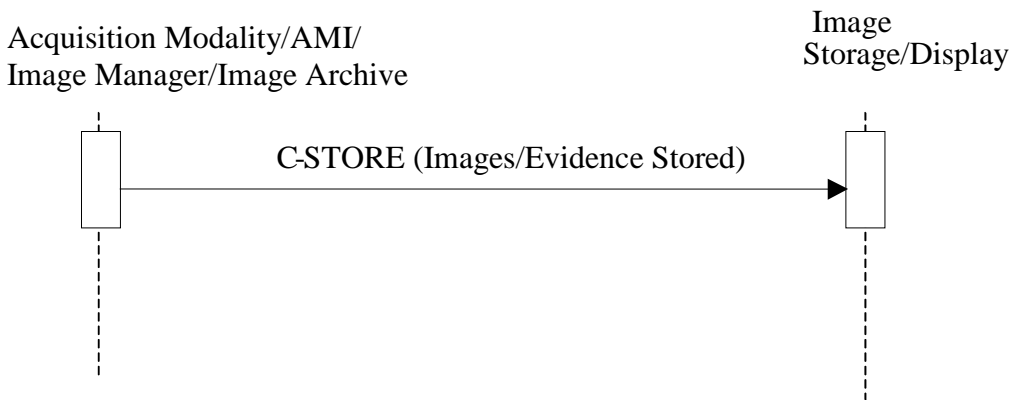
4.18.3.2 Modality Images/Evidence Key Objects Stored

4.18.3.2.1 Trigger Events

The Acquisition Modality, Acquisition Modality Importer or Image Manager/Image Archive transmits key selected images/evidence objects to the Image Storage/Display.

4.18.3.2.1.1 Study UIDs and Series UIDs

See Section 4.2.4.1.1.1.

4.18.3.2.2 Message Semantics

The Acquisition Modalities, Acquisition Modality Importers and Image Manager/Image Archives use the DICOM C-STORE message to transmit the selected images/evidence documents. The Acquisition Modality, Acquisition Modality Importer or Image Manager/Image Archive is the DICOM Storage SCU and the Image Archive is the DICOM Storage SCP.

The information provided from the Modality Worklist transaction (see RAD TF-2: 4.5) SHALL be included in the headers of the generated images. The user validates the available information for the patient and the Scheduled Procedure Step/Requested Procedure. The Acquisition Modality and Acquisition Modality Importers SHALL record certain information in the object

1215   header of the image/evidence document. The details of the mapping to DICOM image/evidence documents instances are specified in RAD-TF 2: Appendix A. Effectively, this appendix strengthens the type definition of some DICOM attributes for the IHE Technical Framework.

4.18.3.2.3 Issuer of Patient ID into Stored Images or Evidence Documents

See EYECARE TF-2: 4.2.4.1.3.

1220   ### 4.18.3.2.4 Expected Actions

4.18.3.2.4.1 Acquisition Modality Actor Requirements

This transaction does not define an Image Archive Actor or an Image Display Actor as a receiving system (i.e., no PACS systems); therefore, these additional requirements are specified for the Acquisition Modality Actor:

1225   1. The Acquisition Modality SHALL offer the ability to send individual DICOM SOP Instances within an imaging study. These DICOM SOP Instances to be sent SHALL be user selectable.

1230   Note: It is expected the user will select "key images" to be viewed by the physicians. Such as when performing a IVFA imaging study many of the images are not in focus or not relevant, the user is expected to perform a QA process to choose the key images.

2. The Acquisition Modality Actor SHALL provide a mechanism for the safe keeping of the images and/or measurements created upon its system. How this is accomplished is outside the scope of IHE. Centralized long-term storage is not part of this transaction and
1235   may be handled by the Image Manager/ Image Archive Actor which is implemented in the other Eye Care Workflow transactions.

3. The mechanisms to ensure safe-keeping of the images and/or measurements SHALL be documented in the Acquisition Modality Actor product's IHE Integration Statement. Examples include increased disk space, disaster recovery, the ability to generate media
1240   (CD-R, DVD, and external hard disk), etc. The Acquisition Modality Actor SHALL have the ability to view all DICOM SOP Instances for which it provides a mechanism for safekeeping. This does not include DICOM SOP Instances based upon the Raw Data Storage SOP Classes.

1245   Note: Although DICOM Raw Data Storage SOP Classes are not required to be displayed, systems may have the ability to display the information from these SOP Classes.

4.18.3.2.4.2 Acquisition Modality Importer Actor Requirements

This transaction does not define an Image Archive Actor or an Image Display Actor as a receiving system (i.e., no PACS systems); therefore, these additional requirements are specified
1250   for the Acquisition Modality Importer Actor:

1. The Acquisition Modality Importer Actor SHALL offer the ability to send individual DICOM SOP Instances within an imaging study. These DICOM SOP Instances to be sent SHALL be user selectable.

1255   Note: An Acquisition Modality Importer connecting to a non-DICOM ophthalmic device should also be able to provide a mechanism for safe keeping of the images and/or measurements it imports.

4.18.3.2.4.3 Image Manager/Image Archive Actor Requirements

This Image Manager/Image Archive Actor SHALL have the ability to send individual DICOM SOP Instances within an imaging study. These DICOM SOP Instances to be sent SHALL be user selectable. How this is accomplished is outside the scope of IHE.

1260

Note: This is an optional feature that may be used in Real World Models I and III.

4.18.3.2.4.4 Image Storage/Display Actor Requirements

This transaction does not define an Image Archive Actor or an Image Display Actor (i.e., no PACS systems); therefore, these additional requirements are specified for the Image
1265   Storage/Display Actor:

1. The Image Storage/Display Actor SHALL have the ability to access and display all DICOM SOP Instances that it is able to locally store and receive. This does not include DICOM SOP Instances based upon the Raw Data Storage SOP Classes.

       Note: Although DICOM Raw Data Storage SOP Classes are not required to be displayed, systems may have the ability to
1270   display the information from theses SOP Classes.

4.18.4 EYE CARE Image Option

See Section 4.2.5, in Core Eye Care Workflow Supplement.

4.18.5 Radiological Studies of the Eye

See Section 4.2.5.1, in Core Eye Care Workflow Supplement.

1275 ### 4.18.6 Encapsulated PDF Option for Evidence Documents

See Section 4.2.6 and all sub-sections of 4.2.6, in Core Eye Care Workflow Supplement.

4.18.7 Eye Care Measurements Option

See Section 4.2.7, in Core Eye Care Workflow Supplement.

4.18.8 Ophthalmic Photography Relative Image Position Coding Option

1280 See Section 4.2.8, in Core Eye Care Workflow Supplement.

4.18.9 Stereo Relationship Option

See Section 4.2.9, in Core Eye Care Workflow Supplement.

4.18.10 Contrast Start Time Reporting in OP Images

See Section: 4.2.10, in Core Eye Care Workflow Supplement.

1285 ### 4.18.11 Acquisition Modality Importer Actor Storage

See Section 4.2.11, in Core Eye Care Workflow Supplement.

4.18.12 Security Considerations

There are no additional security considerations for the Modality Images/Evidence Key Objects Stored transaction, beyond those described in EYECARE TF-1: Appendix E.

1290 ### 4.18.12.1 Security Audit Considerations

ATNA defines security audit events when using a DICOM Storage message. There are no specific updates beyond what is defined in ATNA associated with the Modality Images/Evidence Key Objects Stored transaction nor requirements on the encoding of that audit event.

1295 | *Add new Section 4.19* |

4.19 Patient Demographics Update [EYECARE-19]

This section corresponds to the IHE EYE CARE Patient Demographics Update [EYECARE-19] transaction. It defines the HL7 ADT 08 transaction tailored updating patient demographic data.

1300

Note: It does not include the ability to merge patient IDs; this feature is defined in [EYECARE-20] Merge Patient IDs.

4.19.1 Scope

This transaction enables systems to update patient demographic information within an ambulatory (i.e., outpatient, such as a small eye care clinic) or an in-patient setting.

1305 **4.19.2 Use Case Roles**
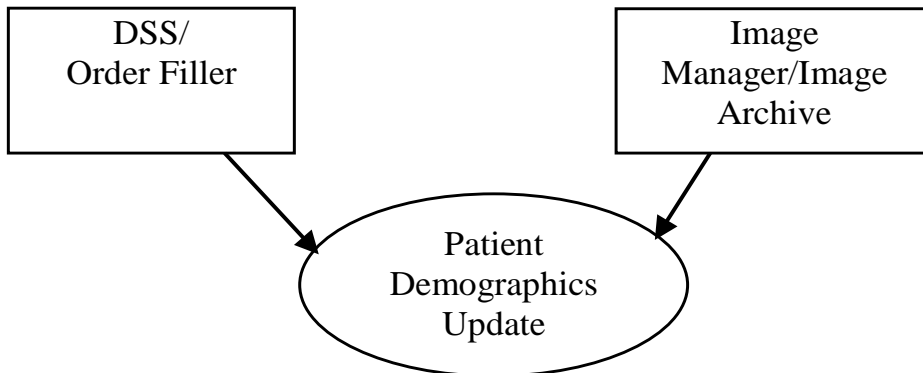
Actor: DSS/Order Filler

Role: Updates patient information

Actor: Image Manager/Image Archive

1310 **Role**: Receives a patient update message and updates the information into its database

4.19.3 Referenced Standards

HL7 v2.5.1 Chapters 2, 3

4.19.4 Interaction Diagram
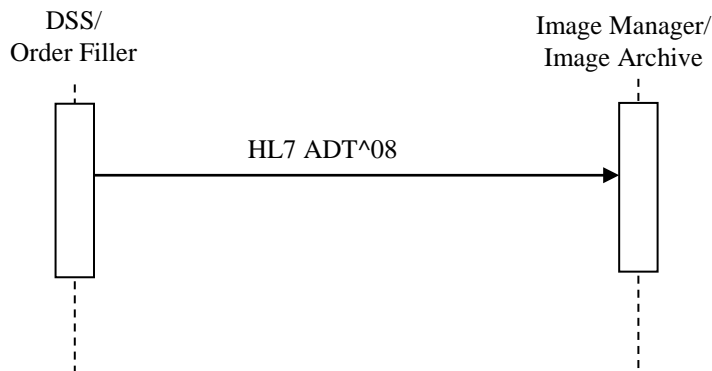
1315 **4.19.4.1 Patient Demographics Update**

4.19.4.1.1 Trigger Events

The following event triggers the ADT message to update patient information.

- A08: Update Patient Information – used when any patient information has changed but when no other trigger event has occurred.

1320 **4.19.4.1.2 Message Semantics**

The Patient Demographics Update – Update Patient Information message is performed by the HL7 ADT 08 message. The DSS/Order Filler Actor SHALL generate the message whenever an error is resolved or a change occurs in patient demographics.

A Patient Registration Source SHALL send all of the required (R and R2) information for a
1325 patient record in an A08 message.

An A08 message is the only method a Patient Registration Source may use to update patient demographic and visit information. However, a Patient Registration Source SHALL not use an A08 message to update Patient ID.

1330 Note: As part of the reconciliation of two patient records, the Patient IDs need to be merged. This is accomplished by supporting the HL7 ADT-40 (Merge Patient ID) message and is defined in transaction Merge Patient IDs [EYECARE-20]. Other transactions in IHE EYE CARE may require the HL7 ADT-40 message.

Required segments are defined below. Other segments are optional.

Table 4.19.4.1.2-1: ADT A08 Required Segments

ADT	Patient Registration Message	REQ	Chapter in HL7 2.5.1
MSH	Message Header	R	2
EVN	Event Type	R	3
PID	Patient Identification	R	3
PV1	Patient Visit	R	3
{IN1}	Insurance	R2	7

1335 *R – Required, R2 – Required if known*

Adapted from the HL7 Standard, version 2.5.1

Each message SHALL be acknowledged by the HL7 ACK message sent by the receiver of the ADT message to its sender.

4.19.4.1.2.1 MSH Segment

1340 The MSH segment SHALL be constructed as defined in ITI TF-2b:3.30.5.1 MSH – Header Segment.

Field *MSH-9-Message Type* SHALL have three components. The first component SHALL have a value of ADT; the second component SHALL have values of A08. The third component SHALL have a value of ADT_A01.

1345 **4.19.4.1.2.2 EVN Segment**

See Section 4.15.4.1.2.2.

4.19.4.1.2.3 PID - Patient Identification segment

The PID segment is used by applications to communicate patient demographic and insurance information.

1350   See Section 4.15.4.1.2.3 for field requirements.

At least one of the fields *PID-18-Patient Account Number* or *PV1-19-Visit Number* SHALL be valued.

4.19.4.1.2.4 PV1 - Patient Identification segment

The PV1 segment is used by applications to communicate information on an account or visit-
1355   specific basis.

See Section 4.15.4.1.2.4 for field requirements.

At least one of the fields *PID-18-Patient Account Number* or *PV1-19-Visit Number* SHALL be valued.

4.19.4.1.2.5 ROL - Role segment

1360   The ROL segment is used by applications to communicate information about providers related to the patient.

See Section 4.15.4.1.2.5 for field requirements.

The ROL segment communicates information about providers related to the patient.

4.19.4.1.2.6 IN1 - Insurance segment

1365   The IN1 segment is used by applications to communicate insurance information on an account or visit-specific basis.

See Section 4.15.4.1.2.6 for field requirements.

4.19.4.1.2.7 Expected Action

The Patient Registration Consumer SHALL update its local patient demographic, visit and/or
1370   insurance information based on the values received in the ADT A08 message.

See Section 4.15.4.2.2 for the Message Semantics of the ADT A08 message.

If an attribute received has a NULL value (i.e., is transmitted as two double quote marks ""‘) in the A08 message SHALL be removed from the Patient Registration Consumer's database for that patient record.

1375   If an attribute received has no value (i.e., is omitted) in the A08 message, the old value should remain unchanged in the receiving system's database for that patient record.

4.19.5 Common HL7 Message Implementation Requirements

The IHE IT Infrastructure Technical Framework has defined general HL7 implementation notes for HL7 V2 messages, for example:

1380
- Using the Minimal Lower Layer Protocol (MLLP) over TCP/IP to transmit messages

- Using HL7 Original Acknowledgement Mode versus the Enhanced Acknowledgment Mode

- Rules for the MSA Segment, ERR Segment

- Empty Field convention

1385
- Other

IHE Actors performing this transaction SHALL comply with requirements defined in IHE ITI TF-2x: C.2 HL7 Implementation Notes (Appendix C).

For HL7 Messages, the term "B" means backwards compatible.

1390
> Note: IHE recognizes that certain deployments may require the use of Network Share Files as the transport mechanism. Although this is considered to be outside the scope of this profile, we do advise to not include MLLP framing characters in Network Share File implementations.

> Note: Receiving TCP Socket Based Implementations that allow senders to remain connected and leave the socket open should ensure that their system properly handles a forcibly disconnected TCP session. TCP sessions can be forcibly disconnected by firewalls, routers, or switches because of congestion, inactivity, or firewall policy violations. Systems
1395
> should reset the socket and be ready to establish a new session when these situations are encountered.

4.19.6 Security Considerations

There are no additional security considerations for the Patient Demographics Update transaction, beyond those described in of EYECARE TF-1: Appendix E.

4.19.6.1 Security Audit Considerations

1400
There are no specific ATNA security audit events associated with the Patient Demographics Update transaction nor requirements on the encoding of that audit event.

Add new Section 4.20

1405
4.20 Merge Patient IDs [EYECARE-20]

This transaction facilitates the merging of multiple IDs for a single patient. It defines the use of the HL7 ADT 40 message.

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4.20.1 Scope

1410

This transaction involves merging patient IDs. These changes may occur at any time for a patient record. This transaction is used for both inpatients (i.e., those who are assigned a bed at the facility) and outpatients (i.e., such as an ambulatory eye care clinic) if the patient has been previously registered.

4.20.2 Use Case Roles
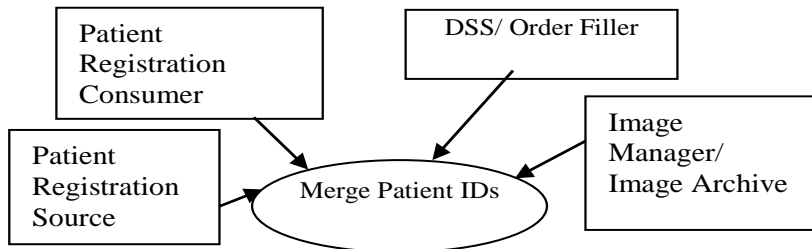
1415   **Actor:** Patient Registration Source

Role: Sends a merge patient ID message

Actor: Patient Registration Consumer

Role: Receives merge patient ID message and merges the two patient IDs into one record in its database

1420   **Actor:** DSS/Order Filler

Role: Sends a merge patient ID message

Actor: Image Manager/Image Archive

Role: Receives merge patient ID message and merges the two patient IDs into one record in its database of images and other evidence documents.

1425   ### 4.20.3 Standards Referenced

HL7 Version 2.5.1 Chapters 2, 3

4.20.4 Interaction Diagram

Patient Registration
Source

Patient Registration
Consumer

HL7 ADT^40

1430

DSS/
Order Filler

Image Manager/
Image Archive
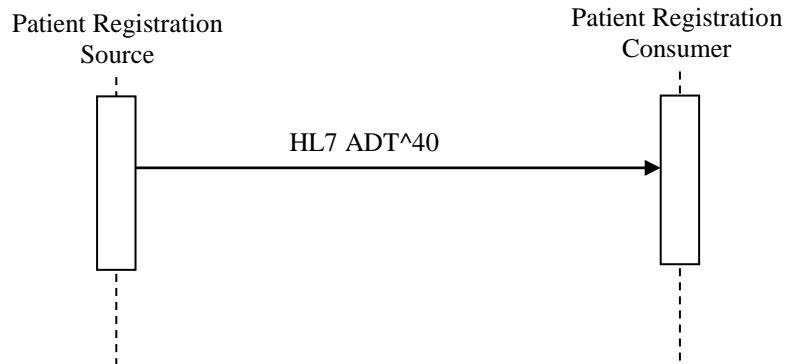
HL7 ADT^40
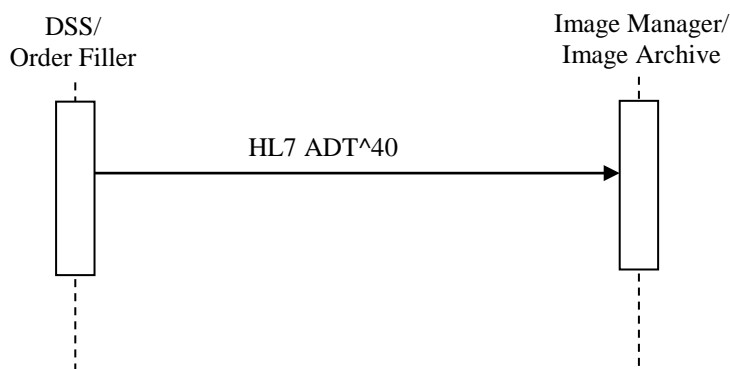
4.20.4.1 Merge Patient IDs

4.20.4.1.1 Trigger Events

1435   The following event triggers the ADT message to merge patient IDs.

- A40 Merge Patient – Patient Identifier List - used to signal a merge of records for a patient that was incorrectly filed under two different identifiers. That is, PID-3-patient ID identifier has been merged with MRG-1 Patient ID.

4.20.4.1.2 Message Semantics

1440   The Update Patient transaction is an HL7 ADT A40 message. The message SHALL be generated by the system that performs the update whenever Patient ID changes or two records are found to reference the same person.

Required segments are defined below. Other segments are optional.

1445

Table 4.20.4.1.2-1: ADT A40 Required Segments

ADT A40	Patient Administration Message	Chapter in HL7 v2.5.1
MSH	Message Header	2
EVN	Event Type	3
PID	Patient Identification	3
MRG	Merge Information	3

Adapted from the HL7 Standard, version 2.5.1

Each message SHALL be acknowledged by the HL7 ACK message sent by the receiver of the ADT message to its sender.

4.20.4.1.2.1 MSH Segment

1450

The MSH segment SHALL be constructed as defined in ITI TF-2b:3.30.5.1 MSH – Header Segment.

Field *MSH-9-Message Type* SHALL have three components. The first component SHALL have a value of ADT; the second component SHALL have values of A40. The third component
1455 SHALL have a value of ADT_A39.

4.20.4.1.2.2 EVN Segment

See Section 4.15.4.1.2.2.

4.20.4.1.2.3 PID Segment

Most of the fields in the PID segment are optional, except those listed in Table 4.20.4.1.2.3-1.

1460

Table 4.20.4.1.2.3-1: PID Segment

SEQ	LEN	DT	OPT	RP/#	TBL#	ITEM#	ELEMENT NAME
3	250	CX	R	Y		00106	Patient Identifier List
5	250	XPN	R	Y		00108	Patient Name

Adapted from the HL7 Standard, version 2.5.1

4.20.4.1.2.4 MRG Segment

1465 The PID segment contains the dominant patient information, including Patient ID (and Issuer of Patient ID). The MRG segment identifies the "old" or secondary patient records to be de-

referenced. HL7 does not require that the 'old' record be deleted; it does require that the "incorrect" identifier not be referenced in future messages following the merge.

1470

Table 4.20.4.1.2.4-1: MRG Segment

SEQ	LEN	DT	OPT	RP/#	TBL#	ITEM#	ELEMENT NAME
1	250	CX	R	Y		00211	Prior Patient Identifier List
2	250	CX	B	Y		00212	Prior Alternate Patient ID
3	250	CX	O			00213	Prior Patient Account Number
4	250	CX	R2			00214	Prior Patient ID
5	250	CX	O			01279	Prior Visit Number
6	250	CX	O			01280	Prior Alternate Visit ID
7	250	XPN	R2	Y		01281	Prior Patient Name

Adapted from the HL7 Standard, version 2.5.1

A separate merge message SHALL be sent for each patient record to be merged. For example, if Patients A, B, and C are all to be merged into Patient B, two MRG messages would be sent. In
1475 the first MRG message patient B would be identified in the PID segment and Patient A would be identified in the MRG segment. In the second MRG message, patient B would be identified in the PID segment, and Patient C would be identified in the MRG segment. The visits and accounts of patients A and C will now belong to patient B's record along with B's original visits and accounts.

1480 Modification of any patient demographic information SHALL be done by sending a Patient Update Information (ADT^A08^ADT_A01) message for the current Patient ID. An A40 message is the only method that may be used to update a Patient ID.

4.20.4.1.2.5 Expected Action

After receiving a Patient Merge message (A40) the receiving system SHALL perform updates to
1485 reflect the fact that two patient records have been merged into a single record. If the correct target patient was not known to the receiving system, the receiving system shall create a patient record using the patient identifiers and demographics from the available PID segment data.

The Image Manager SHALL ensure that the patient information has been updated in the diagnostic images and evidence objects (e.g., images, Key Image Notes, Grayscale Softcopy
1490 Presentation States, Evidence Documents, etc.) they manage when they are retrieved.

4.20.5 Common HL7 Message Implementation Requirements

The IHE IT Infrastructure Technical Framework has defined general HL7 implementation notes for HL7 V2 messages, for example:

- Using the Minimal Lower Layer Protocol (MLLP) over TCP/IP to transmit messages

1495
- Using HL7 Original Acknowledgement Mode versus the Enchanted Acknowledgment Mode

- Rules for the MSA Segment, ERR Segment

- Empty Field convention

- Other

1500   IHE actors performing this transaction SHALL comply with requirements defined in IHE ITI TF-2x:C.2 HL7 Implementation Notes (Appendix C).

> Note: IHE recognizes that certain deployments may require the use of Network Share Files as the transport mechanism. Although this is considered to be outside the scope of this profile, we do advise to not include MLLP framing characters in Network Share File implementations.

1505
> Note: Receiving TCP Socket Based Implementations that allow senders to remain connected and leave the socket open should ensure that their system properly handles a forcibly disconnected TCP session. TCP sessions can be forcibly disconnected by firewalls, routers, or switches because of congestion, inactivity, or firewall policy violations. Systems should reset the socket and be ready to establish a new session when these situations are encountered.

4.20.6 Security Considerations

1510   There are no additional security considerations for the Merge Patient IDs transaction, beyond those described in Appendix E of EYECARE TF-1.

4.20.6.1 Security Audit Considerations

There are no specific ATNA security audit events associated with the Merge Patient IDs transaction nor requirements on the encoding of that audit event.

1515

> *Add new Section 4.21*

4.21 Procedure Scheduled [EYECARE-21]

This section corresponds to the IHE EYE CARE Procedure Scheduled [EYECARE-21]
1520   transaction. It defines the HL7 OMG V2.5.1 transaction used by the DSS/Order Filler and Image Manager/Image Archive actors.

4.21.1 Scope

This transaction specifies a message from the DSS/Order Filler to notify the Image Manager /Image Archive that a procedure has been scheduled.

1525   Scheduling does not necessarily mean precise time assignment for the particular procedures. The DSS/Order Filler must provide the date and time when the procedure is to be performed,

although precision of the time portion of that information is allowed to be implementation dependent.

1530   This message serves as a trigger event for the Image Manager/Image Archive to obtain necessary information and apply rules to ensure the availability of relevant information to the end user. For certain workflows, it is used to enable the Image Manager/Image Archive to support DICOM Modality Worklist queries.

The organization operating the DSS/OF and the Image Manager/Image Archive is responsible for synchronizing Procedure and Protocol Codes between all the systems that use such codes.

1535   IHE does not yet define a common mechanism for code synchronization or access.

4.21.2 Use Case Roles
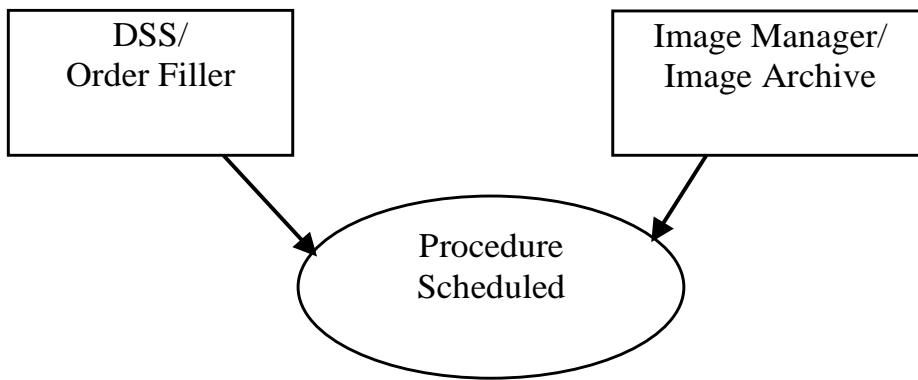
Actor: DSS/Order Filler

Role: Updates patient and procedure information

1540   **Role:** Enters, modifies and stores information about patients, generates orders, schedules Procedures (exams), modifies information about them (rescheduling, cancellations, code changes, etc.).

Actor: Image Manager/Image Archive

Role: Receives information about Patients, Orders, and schedules, and uses this information to
1545   assist in image management and/or DICOM Modality Worklist.

4.21.3 Referenced Standards

HL7 v2.5.1 Chapters 2-4, 7

4.21.4 Interaction Diagram

DSS/Order Filler

Image Manager /Image Archive

OMG (Procedure Scheduled)
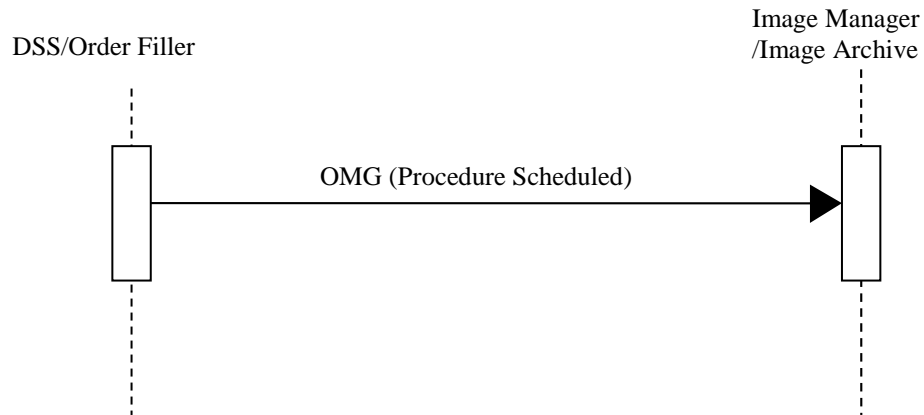
1550 ### 4.21.4.1 Procedure Scheduled Message

4.21.4.1.1 Trigger Events

The DSS/Order Filler determines procedures which need to be performed to fill the order, what Procedure Steps need to be performed for each Procedure, and timing and necessary resources.

4.21.4.1.2 Message Semantics

1555 The DSS/Order Filler uses an OMG message to convey necessary procedure and scheduling information.

The Procedure Scheduled Transaction will perform the additional task of providing patient demographic information to the Image Manager/Image Archive. The Image Manager/Image Archive does not receive Patient Registration (A04) messages therefore the Image
1560 Manager/Image Archive SHALL obtain the patient demographic information from the Procedure Scheduled OMG message, specifically the PID and PV1 segments. For this reason, the DSS/Order Filler must complete these segments as described in Section 4.15, Patient Registration [EYECARE-15].

Segments listed below are required, required if known, conditional or optional. Other segments
1565 are optional.

OMG	General Order Message	REQ	Chapter in HL7 2.5.1
MSH	Message Header	R	2
PID	Patient Identification	R	3
PV1	Patient Visit	R	3

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OMG	General Order Message	REQ	Chapter in HL7 2.5.1
{ORC	Common Order	R	4
{TQ1}	Timing and Quality	R	4
OBR	Order Detail	R	7
[{NTE}]	Notes and Comments (for Detail)	O	4
[{ZDS}] }	Additional identification information (custom for IHE)	C*	

R – Required, R2 – Required if known, C= Conditional, O = Optional

Adapted from the HL7 Standard, version 2.5.1

1570   *The ZDS segment SHALL be required when this transaction is used for U-EYECARE Integration Profile Real World Models I and II. It is optional for other models or profiles unless stated differently by the specific profile.

Each message SHALL be acknowledged by the HL7 ACK message sent by the receiver of the OMG message to its sender.

1575   **4.21.4.1.2.1 MSH Segment**

The MSH segment SHALL be constructed as defined in ITI TF-2b:3.30.5.1 MSH – Header Segment.

Field *MSH-9-Message Type* SHALL have three components. The first component SHALL have a value of OMG; the second component SHALL have values of O19. The third component
1580   SHALL have a value of OMG_O19.

4.21.4.1.2.2 PID - Patient Identification segment

The PID segment is used by applications to communicate patient demographic and insurance information.

See Section 4.15.4.1.2.3 for field requirements.

1585   At least one of the fields *PID-18-Patient Account Number* or *PV1-19-Visit Number* SHALL be valued.

4.21.4.1.2.3 PV1 - Patient Identification segment

The PV1 segment is used by applications to communicate information on an account or visit-specific basis.

1590   See Section 4.15.4.1.2.4 for field requirements.

At least one of the fields *PID-18-Patient Account Number* or *PV1-19-Visit Number* SHALL be valued.

4.21.4.1.2.4 ORC – Common Order segment

All of the fields in the ORC segment are optional, except those listed in Table 4.21.4.1.2.4-1.

1595

Table 4.21.4.1.2.4-1: IHE Profile - ORC Segment

SEQ	LEN	DT	OPT	TBL#	ITEM #	ELEMENT NAME
1	2	ID	R	0119	00215	Order Control
2	22	EI	R2		00216	Placer Order Number
3	22	EI	R		00217	Filler Order Number
5	2	ID	R	0038	00219	Order Status
7	200	TQ	X		00221	Quantity/Timing
10	250	XCN	R2		00224	Entered By
12	250	XCN	R2		00226	Ordering Provider
13	80	PL	R2		00227	Enterer's Location
14	250	XTN	R2		00228	Call Back Phone Number
17	250	CE	R2		00231	Entering Organization

R – Required, R2 – Required if known

Adapted from the HL7 Standard, version 2.5.1

1600   Deprecated component *ORC-7.4-Start Date/Time* SHALL not be populated. The TQ1 segment SHALL be used to carry the start date and time of the procedure.

The DSS/Order Filler SHALL use the OMG message to send as many OMG messages as there are Requested Procedures identified to fill a single order.

Required fields in the ORC segment SHALL be filled by the DSS/Order Filler as given in Table
1605   4.21.4.1.2.4-2.

Table 4.21.4.1.2.4-2: DSS Mappings of the ORC Segment

Element Name	Seq.	Element Shall Contain:	Notes
Order Control Code	ORC-1	"NW"	New order

Element Name	Seq.	Element Shall Contain:	Notes
Placer Order Number	ORC-2	Placer Order Number received from Order Placer	In the event that the Order Filler places the order and the Order Filler is not connected to an Order Placer, this field SHALL be empty. If the Order Filler places the order and is connected to an Order Placer, the Order Filler SHALL NOT send the scheduling OMG message until it has received the Placer Order Number from the Order Placer (through an ORR message).
Filler Order Number	ORC-3	Filler Order Number	Number generated internally by the Department System Scheduler
Order Status	ORC-5	"SC"	Scheduled

4.21.4.1.2.5 TQI – Timing/Quantity segment

1610   All of the fields in the TQ1 segment are optional, except those listed in Table 4.21.4.1.2.5-1.

Table 4.21.4.1.2.5-1: IHE Profile – TQ1 Segment

SEQ	LEN	DT	OPT	TBL#	ITEM#	ELEMENT NAME
7	26	TS	R		01633	Start date/time
9	250	CWE	R2	0485	01635	Priority
12	10	ID	C	0472	01638	Conjunction

R – Required, R2 – Required if known, C= Conditional

Adapted from the HL7 Standard, version 2.5.1

1615

Field *TQ1-7 – Start date/time* SHALL contain the scheduled start date and time of the procedure.

Scheduling does not necessarily mean precise time assignment for the particular procedures. However, the DSS/Order Filler SHALL handle all orders in such a way that it is capable of informing the Image Manager/Image Archive about procedure timing and resources used to
1620   perform a procedure. It must provide the date and time when the procedure is to be performed, although precision of the time portion of that information is allowed to be implementation dependent.

4.21.4.1.2.6 OBR – Order Details segment

All of the fields in the OBR segment are optional, except those listed in Table 4.21.4.1.2.6-1.

1625

Table 4.21.4.1.2.6-1: IHE Profile - OBR Segment

SEQ	LEN	DT	OPT	TBL#	ITEM#	ELEMENT NAME
1	4	SI	R		00237	Set ID – OBR
2	22	EI	R2		00216	Placer Order Number
3	22	EI	R		00217	Filler Order Number
4	250	CE	R		00238	Universal Service ID
5	2	ID	X		00239	Priority
12	250	CE	R2		00246	Danger Code
13	300	ST	R2		00247	Relevant Clinical Info.
16	250	XCN	R2		00226	Ordering Provider
17	250	XTN	R2		00250	Order Callback Phone Number
18	60	ST	R		00251	Placer field 1
19	60	ST	R		00252	Placer field 2
20	60	ST	R		00253	Filler Field 1
24	10	ID	R	0074	00257	Diagnostic Serv Sect ID
27	200	TQ	X		00221	Quantity/Timing
30	20	ID	R2	0124	00262	Transportation Mode
31	250	CE	R2		00263	Reason for Study
46	250	CE	R2	0411	01474	Placer Supplemental Service Information

R – Required, R2 – Required if known

Adapted from the HL7 Standard, version 2.5.1

1630 One ORC-OBR with the optional ZDS segment group SHALL correspond to each Requested Procedure. If a Requested Procedure is comprised of multiple Scheduled Procedure Steps and/or if a Scheduled Procedure Step is comprised of multiple Protocol Codes, each applicable Scheduled Procedure Step / Protocol Code combination SHALL be included in a separate ZDS segment if the optional segment is supported following the ORC-OBR segment group that

1635 contains the Requested Procedure.

- Field OBR-46-Placer Supplemental Service Information SHALL contain the laterality (Left/Right) indicator (when applicable). Field OBR-15-Specimen Source, which had formerly been adapted for this use by the IHE Technical Framework and has been deprecated in HL7 Version 2.5.1, SHALL NOT be present.

1640 - Per the HL7 Standard, IHE recommends that some fields in the ORC and OBR segments contain the same information.

Identical Element Mappings between ORC and OBR Segments

Element Name	ORC Segment Element	OBR Segment Element
Placer Order Number	ORC-2	OBR-2
Filler Order Number	ORC-3	OBR-3
Parent	ORC-8	OBR-29

1645   Non-optional fields in the OBR segment that are not identical to those from the ORC segment SHALL be filled by the DSS/Order Filler as defined in the following table.

Table 4.21.4.1.2.6-2: DSS mappings of the OBR Segment

Element Name	Seq.	Shall Contain:	Notes
Placer Field 1	OBR-18	Accession Number	Length of the value in this field SHALL NOT exceed 16 characters
Placer Field 2	OBR-19	Requested Procedure ID	All OBR segments within a single ORM message SHALL have the same value in this field.
Filler Field 1	OBR-20	Scheduled Procedure Step ID	If a Scheduled Procedure Step has multiple Protocol Codes associated with it, several ORC segments within a single ORM message may have the same value in this field.
Universal Service ID	OBR-4	The Universal Service ID of the Order.	Components 1-3 of OBR-4 in all OBR segments of SHALL have the same value. The related Requested Procedure Code/ Description are sent in OBR-44. As the Order Filler may expand a single order into multiple Requested Procedures, multiple ORM messages may be sent for a single Order (with the same value for Components 1-3 of OBR-4).
Diagnostic Service Section ID	OBR-24	DICOM Modality	The Modality attribute of DICOM consists of Defined Terms that SHALL be used in this element.
Procedure Code	OBR-44	Requested Procedure Code and Requested Procedure Description.	Components 1-3 SHAL contain the Requested Procedure Code for this ORM message. Optionally, component 5 may contain the Requested Procedure Description.
Placer Supplemental Service Information	OBR-46	This element shall be used for the L/R (laterality) indicator, if applicable. The L/R value shall be appended to the Requested Procedure Description (0032,1060).	This element SHALL only be used if the coding scheme that is employed does not contain laterality within the coding scheme itself. If laterality is inherent in the coding scheme, this element SHALL NOT be sent.

1650

The ZDS Segment is defined to convey information generated by the DSS/Order Filler and not currently defined in the HL7 standard and is given in the following table.

Table 4.21.4.1.2.6-3: IHE Profile - ZDS Segment

SEQ	LEN	DT	OPT	TBL#	ITEM#	ELEMENT NAME
1	200	RP	R		Z0001	Study Instance UID

1655 Components of the Study Instance UID field SHALL be encoded as given in Table 4.21.4.1.2.6-4.

Table 4.21.4.1.2.6-4: Z Segment Study Instance UID Element Components

Component Number	Component Name	Shall Contain:
1	Reference Pointer	DICOM compliant Study Instance UID value
2	Application ID	Implementation specific
3	Type of Data	"Application"
4	Subtype	"DICOM"

4.21.4.1.2.7 NTE – Notes and Comments (for Details) segment

1660

The NTE segment is a common format for sending notes and comments. It is provided in this transaction for a mechanism to convey procedure instructions to the Image Manager/Image Archive. For example there might be instructions to tape the eyelids while performing a visual field or to concentrate on a specific region of the eye during the early stage of an angiogram, etc.

1665 The Image Manager/Image Archive may convey this information to Acquisition Modality and Acquisition Modality Importer Actors using DICOM Modality Worklist.

NTE-2 Source of Comment SHALL contain "LPI" to denote that the instruction is a Limited Procedure Instruction.

Although the NTE Comment Element allows for 64K, the length SHALL be limited to 10,240
1670 characters to accommodate the DICOM Modality Worklist Requested Procedure Comments attribute length to which this value maps (see Imaging Procedure Instructions Status Option in [EYECARE-1]), see Section 4.1.6.

All of the fields in the NTE segment are optional, except those listed in Table 4.21.4.1.2.7-1.

1675   **Table 4.21.4.1.2.7-1: IHE Profile - NTE Segment**

SEQ	LEN	DT	OPT	TBL#	ITEM#	ELEMENT NAME
1	4	SI	O		00096	Set ID - NTE
2	8	ID	R2	0105	00097	Source of Comment
3	10,240	FT	R		00098	Comment
4	60	CE	O		01318	Comment Type

R – Required, R2 – Required if known, O - Optional

Adapted from the HL7 Standard, version 2.5.1

Modified Table 0105 Source of comment

Table	Code	Code Meaning
0105	LPI	Limited Procedure Instruction

1680

4.21.4.1.2.8 Expected Action

The Image Manager/Image Archive SHALL update its local patient demographic, visit and order information based on the values received in the OMG message. If it supports DICOM Modality Worklist, it SHALL use the OMG message to populate the worklist message (see RAD TF-2: Table B-1, HL7 Order Mapping to DICOM MWL.)

1685

4.21.5 Common HL7 Message Implementation Requirements

The IHE IT Infrastructure Technical Framework has defined general HL7 implementation notes for HL7 V2 messages, for example:

- Using the Minimal Lower Layer Protocol (MLLP) over TCP/IP to transmit messages

1690
- Using HL7 Original Acknowledgement Mode versus the Enhanced Acknowledgment Mode

- Rules for the MSA Segment, ERR Segment

- Empty Field convention

- Other

1695 IHE Actors performing this transaction SHALL comply with requirements defined in IHE ITI TF-2x: C.2 HL7 Implementation Notes (Appendix C).

For HL7 Messages, the term "B" means backwards compatible.

Note: IHE recognizes that certain deployments may require the use of Network Share Files as the transport mechanism. Although this is considered to be outside the scope of this profile, we do advise to not include MLLP framing characters in
1700 Network Share File implementations.

Note: Receiving TCP Socket Based Implementations that allow senders to remain connected and leave the socket open should ensure that their system properly handles a forcibly disconnected TCP session. TCP sessions can be forcibly disconnected by firewalls, routers, or switches because of congestion, inactivity, or firewall policy violations. Systems should reset the socket and be ready to establish a new session when these situations are encountered.

1705 ### 4.21.6 Security Considerations

There are no additional security considerations for the Procedure Scheduled transaction, beyond those described in of EYECARE TF-1: Appendix E.

4.21.6.1 Security Audit Considerations

There are no specific ATNA security audit events associated with the Procedure Scheduled
1710   transaction nor requirements on the encoding of that audit event.

Add new Section 4.22

4.22 Procedure Status Update [EYECARE-22]

1715   This section corresponds to the IHE EYE CARE Procedure Status Update [EYECARE-22]
transaction.

4.22.1 Scope

It defines the HL7 OMG message used by the Image Manager/Image Archive to notify the
DSS/Order Filler about changes in the status for the fulfillment of an eye care order such as order
1720   completed (i.e., images and/or measurements have been archived and are available for
interpretation).

It also provides an optional ability to convey a reference pointer (i.e., URL) to one or more
images/measurements.

4.22.2 Use Case Roles
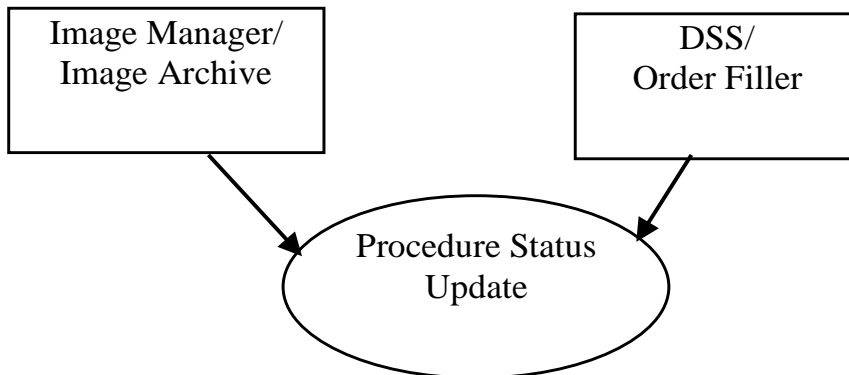
1725

Actor: Image Manager/Image Archive

Role: Updates order status information

Role: Provides updates to orders that have been created by the DSS/Order Filler such as
completed (all image/measurements available), or results available (at least one
1730   image/measurement is available), etc.
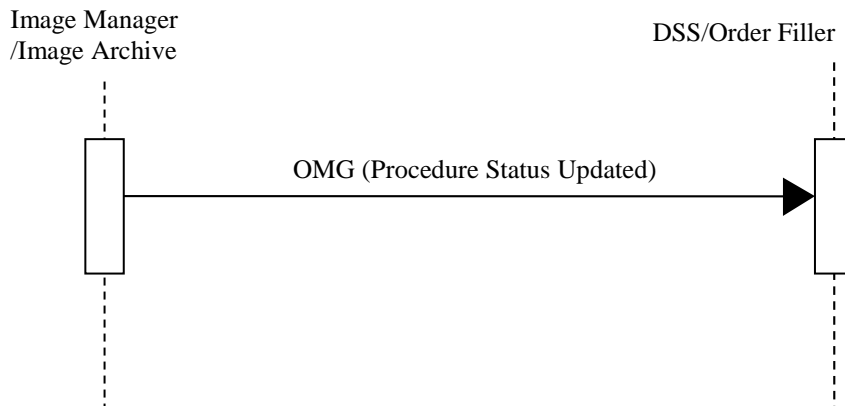
Actor: DSS/Order Filler

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Role: Receives updates about the orders it has created and processes the updates (such as informing a user images/measurements are available for interpretation).

4.22.3 Referenced Standards

1735   HL7 v2.5.1 Chapters 2-4, 7

4.22.4 Interaction Diagram

1740   **4.22.4.1 Procedure Status Updated Message**

4.22.4.1.1 Trigger Event

An Image Manager/Image Archive wants to notify the DSS/Order Filler about changes in the status for the fulfillment of an eye care order such as order completed (i.e., images and/or measurements have been archived and are available for interpretation).

1745   **4.22.4.1.2 Message Semantics**

The Image Manager/Image Archive and DSS/Order Filler are required to support the HL7 v2.5.1 interface requirements described in the referenced volumes and sections.

HL7 v2.5.1 Chapter 4 OMG message. Refer to HL7 Standard for general message semantics.

Segments listed below are required or optional. Other segments are optional.

1750

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OMG	General Order Message	REQ	Chapter in HL7 2.5.1
MSH	Message Header	R	2
ORC	Common Order	R	4
TQ1	Timing and Quality	R	4
OBR	Order Details	R	4
[OBX]	Observation/Result	O	4

R – Required, O = Optional

Adapted from the HL7 Standard, version 2.5.1

4.22.4.1.2.1 MSH Segment

The MSH segment SHALL be constructed as defined in ITI TF-2b:3.30.5.1 MSH – Header Segment.

Field MSH-9-Message Type SHALL have three components. The first component SHALL have a value of OMG; the second component shall have a value of O19; the third component shall have a value of OMG_O19.

4.22.4.1.2.2 ORC Segment

All of the fields in the ORC segment are optional, except those listed in Table 4.22.4.1.2.2-1.

Table 4.22.4.1.2.2-1: IHE Profile - ORC Segment

SEQ	LEN	DT	OPT	TBL#	ITEM #	ELEMENT NAME
1	2	ID	R	0119	00215	Order Control
2	22	EI	R2		00216	Placer Order Number
3	22	EI	R		00217	Filler Order Number
5	2	ID	R	0038	00219	Order Status
7	200	TQ	X		00221	Quantity/Timing

R – Required, R2 – Required if known

Adapted from the HL7 Standard, version 2.5.1

Deprecated component *ORC-7.4-Start Date/Time* SHALL not be populated. The TQ1 segment SHALL be used to carry the start date and time of the procedure.

ORC-2 Order Control SHALL contain "SC"

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ORC-5 Order Status SHALL contain a value from Table 4.22.4.1.2.2-2. The Image Manager/Image Archive SHALL support at least one of the Order Status Codes with the value of "CM" or "A".

The DSS/Order Filler SHALL be able to process all Order Status Codes.

1775

Table 4.22.4.1.2.2-2 Order Status Codes

Value	Description	Meaning
CM	Order is completed	Image Manager/Image Archive determines it has all the images/measurements for the procedure. How this is accomplished is outside the scope of IHE.
DC	Order was discontinued	IHE does not define the trigger for the discontinued status.
IP	In progress, unspecified	IHE does not define the trigger for the in progress status.
A	Some, but not all results available	Image Manager/Image Archive determines it has at least one of the images/measurements for the procedure. How this is accomplished is outside the scope of IHE.

Adapted from the HL7 Standard, version 2.5.1

4.22.4.1.2.3 TQ1 Segment

1780 All of the fields in the TQ1 segment are optional, except those listed in Table 4.22.4.1.2.3-1.

Deprecated components *ORC-7.4-Start Date/Time* or *OBR-27.4-Start Date/Time* SHALL NOT be populated. The TQ1 segment SHALL be used to carry the start date and time of the procedure.

1785 **Table 44.22.4.1.2.3-1: IHE Profile – TQ1 Segment**

SEQ	LEN	DT	OPT	TBL#	ITEM #	ELEMENT NAME
7	26	TS	R		01633	Start Date/Time
12	10	ID	C	0427	01638	Conjunction

R – Required, C= Conditional

Adapted from the HL7 Standard, version 2.5.1

Field *TQ1-7-Start Date/Time* SHALL contain the date and time of the procedure.

1790 **4.22.4.1.2.4 OBR Segment**

All of the fields in the OBR segment are optional, except those listed in Table 4.22.4.1.2.4-1.

Table 4.22.4.1.2.4-1: IHE Profile - OBR Segment

SEQ	LEN	DT	OPT	TBL#	ITEM #	ELEMENT NAME
2	22	EI	R2		00216	Placer Order Number
3	22	EI	R		00217	Filler Order Number

R – Required, R2 – Required if known

Adapted from the HL7 Standard, version 2.5.1

1795

Deprecated component *OBR-27.4-Start Date/Time* SHALL NOT be populated. The TQ1 segment SHALL be used to carry the start date and time of the procedure.

4.22.4.1.2.5 OBX Segment

The OBX segment is an optional segment which may be used to provide information about many
1800 different types of observations.

For the scenario where the Image Manager/Image Archive wishes to provide a reference pointer to an image/measurement or a set of images/measurements that it has stored, it SHALL implement the OBX segment as defined below.

1805 **Table 4.22.4.1.2.5-1: IHE Profile – OBX Segment**

SEQ	LEN	DT	OPT	TBL#	ITEM #	ELEMENT NAME
2	2	ID	R	0125	00570	Value Type
3	250	CE	R		00571	Observation Identifier
4	20	ST	C		00572	Observation Sub-ID
5	99999	varies	R		00573	Observation Value
11	1	ID	R	0085	00579	Observe Result Status

R – Required, R2 – Required if known, C= Conditional

Adapted from the HL7 Standard, version 2.5.1

OBX-2-Value Type SHALL contain the value "RP" (for Reference Pointer).

1810 *OBX-5- Observation Value* SHALL contain the URL for where the image/measurement or the set of images/measurements can be accessed. The method to access the image/measurements is outside the scope of IHE.

The OBX segment may be used to provide other observation information that is outside the scope of IHE.

4.22.4.1.2.6 Expected Actions

The Image Manager/Image Archive SHALL provide the DSS/Order Filler with one or more status updates on the order.

The DSS/Order Filler processes the order status based upon the internal application (such as the procedure is completed and is ready for interpretation). The DSS/Order Filler is recommended to convey the order status to the user of the system.