Digital Imaging and Communications in Medicine (DICOM)

Supplement 164: Contrast Agent Administration Reporting

DICOM Standards Committee, Working Group 6 (Base Standard) Ad Hoc Group

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Table of Contents

Scope and Field of Application

This supplement introduces IODs that describe the administration of imaging agents. The supplement applies to all modalities in which imaging agents are introduced into a subject's circulatory system in a controlled fashion (e.g., CT, MR, XA).

The new SOP Classes describe administration events, flows, pressure, timings, physio-chemical attributes and pharmacological attributes of the agent administration and also consumables related to the administration.

- The **Planned Imaging Agent Administration SR** Storage SOP Class represents patient specific plans to deliver the imaging agent. The plan is tuned to the characteristics of a patient and needs of that procedure.
- The **Performed Imaging Agent Administration SR** Storage SOP Class is for reporting the actual administration delivered during a medical imaging study. The operator may program a delivery system with an intended delivery. This program is captured in this object. The delivery system or a user may deviate from the programmed plan based on a variety of factors. The actual delivery is also captured in this object.

These SOP classes do not describe administration of radiopharmaceuticals, which is addressed by R-RDSR.

CLOSED ISSUES

1	**Q**: Should this supplement address the planned and delivered infusion data for radiopharmaceuticals at NM studies? A conceivable use-case is that a contrast agent administration SR object is created by a contrast dose manager containing the administered radiopharmaceutical data. This object is accessed by a radiopharmaceutical manager actor and it extracts the relevant data for population into a radiopharmaceutical administration dose report SR object. **A:** No. Additional injection-related information may be added to R-RDSR at a later date to allow it to be populated by a radiopharmaceutical manager actor and extracted by an injector. This issue is closed.
2	**Q.** It was discussed that the summary object (Basic Performed Imaging Agent Admin) could reference the detailed objects (contrast agent admin SR Objects) – Under General Series, how do we refer to detailed objects, from the summary object? **A:** Contrast Agent Admin SR has been eliminated. In case of such a need to refer "performed" instance, use explicit UID reference. This issue is Closed.

3	**Q:** In Basic Contrast Administration SOP, the series is under General Series Module C.7.3.1 What is the value for modality attribute (0008,0060)? Do we assign a new modality value? **A:** Yes, there will be new value for all objects.
4	**Q:** Under module table of all new SOP definitions, "Synchronization" (C.7.4.2) module is included under "Frame Of Reference" IE**.** This module has Frame Of Reference UID as type 1 – which may not be available to the contrast infusion manager; Do we include a new module attribute table? **A:** Generate new UID for "Frame of Reference UID". This issue is Closed.
5	**Q:** Similar to Issue 3, The Performed Imaging Agent Admin SOP could reference scheduled SOP instance? In this case, do we include this reference under series module? **A:** Either put an explicit UID reference in performed object or directly look up based on the Study UID. This issue is closed.
6	**Q:** What is the use of Contrast Agent Administration SR? Can we instead use Key-Objection-Selection SR document for this purpose? **A:** Originally, when proposed, the 'Contrast Agent Administration SR' is designed to hold various contexts like Patient risk-factor context, pre-medication contexts, other than the 'Scheduled' and 'Performed' Contrast Agent Admin. SR objects. This issue stands closed as 'Contrast Agent Administration SR' is eliminated.
7	**Q:** Design of Basic Performed Imaging Agent IOD: Treat it as SR (KOS Style) or treat it like standard tags, which require adding a new IE (Contrast/Bolus Agent IE). **A:** Adding a new Contrast/Bolus Agent IE. Closed.
8	To discuss: On a multiple injection per accession-number scenario, (where the injection is aborted for some reasons and redone again, or when a test injection is delivered before a main injection, etc.) there could be simply n "performed" objects – as we are not aggregating all of them under one "performed" object. What are the workflow implications? We want to ensure this point is clearly understood and handled before we finalize this design. **A:** Yes. Aggregated reporting is not considered. Closed
9	Could we add concept code values indicating if the contrast agent administration was completed or aborted. (this is for quick "Yes/No" indication to help consumer know if the injection was successful or not) Secondly, if we agree for the above, how does one add it under "Enhanced Contrast/Bolus Module" (C.7.6.4b of Part-3) "Basic Contrast Agent Admin. IOD"? – Should we go ahead and extend this module? **A:** Yes, we could flag Completed / Terminated / User Aborted, however cannot say successful.

10	Another workflow scenario question: As the “Basic Performed Imaging Agent Admin.” Object is primarily meant for sending out to modality, the infusion manager that creates this object has to accurately obtain this Study UID? – how does one ensure this works especially when the modality is “site configured” to ignore sharing Study-UID coming from the worklist-server but generate one on its own? In other words, if the “Basic Performed Imaging Agent Admin.” Object has a different Study-UID from that of the images cut by the modality, what is the impact? **A:** Question is Out of scope.
11	**Q:** Imaging Agent Admin. Plan – Separate instance or just template? **A:** It was ideated to create another SOP for ‘Imaging Agent Administration Plan’, to be referenced under planned/performed objects – however it was then decided not to go in that direction (in Jun 2013 WG-06 meeting). Instead, will add “Defined” object, which is non-patient specific similar to hanging-protocol objects.
12	**Q:** Should we create performed object if the agent was never administered but only attempted? **A:** Yes, Utilization of suites, inventory perspective we generate one. Make up your own StudyUID in case not if there is’nt one available. It’s up to the PACS to re-concile.
13	**Q:** Work on Adverse Event Grade under adverse event template. **A:** Not a WG-06 question.
14	**Q:** Should 7.4.2 Synchronization module be optional under Planned/Performed Imaging Agent Admin. IODs? **A:** It is mandatory in performed object, not required to add in planned object.
15	**Q:** Design of Defined SR IOD – Add Defined Subst. Admin. IE? How does it affect ‘Contrast Agent IE’ under Basic-Performed Object change then? Should we change it to ‘Subst. Admin. IE’? **A:** Use ‘Imaging Agent Admin. IE’ in both defined and Basic sop modules. Make ‘Defined’ object using the same document IE without Patient/Study/Series IE. Add ‘Subst. Admin IE’ and use it in Basic object – See Enhanced Contrast/Bolus module attributes C.7.64b and Imaging Agent Administration module attributes Defined object is out of scope. Closed.
16	**Q:** As an Infusion Manager, one who creates the Contrast Agent Admin. Objects, how do we link to the R-RDSR objects (sup159) ? Do we share a common event UID and have it referred under use General Series module? If the answer is yes for the above question, how does one obtain the Event UID string? **A:** Closed. Irrelevant, since it has been agreed to remove radiopharmaceuticals.
17	**Q:** In relation to closed issue#1 – if we have decided to support data from radiopharmaceuticals, then what items from radiopharmaceutical template should be included? Sup159 has exhaustive details What data from supplement 159 related to radio-pharma administration needs inclusion? **A:** Closed. Irrelevant, since it has been agreed to remove radiopharmaceuticals.

18	**Q:** Consider renaming Contrast Agent Administration Reporting to Imaging Agent Administration Report? **A:** Yes. This would be a replacement for Imaging Agent Administration log. Need to include Imaging Agent administration approval? – Wanted to clarify if this contradicts with the existing Imaging Agent Administration?
19	**Q:** In a scenario when an injector is physically moved to from modality A to modality B (but still configured to modality A), how do we prevent/handle the issue of injector device sending report to the wrong destination (i.e., modality A)? **A:** Closed. Nothing could be done about it. Cannot be addressed in DICOM.
20	**Q:** In the concept table CID xx12, one of the premedication component is listed as 'Dexamethasone sodium sulfate" – Please verify and confirm if this is right. (i.e., Is this Dexamethasone sodium phosphate?) **A:** Closed. Its Dexamethasone sodium sulfate – confirmed from ACR Manual of Contrast Media.
21	**Q:** In Context table CID xx18 (Consumable type), do we add radiopharma explicitly? **A:** Closed. No. It has been agreed to remove radiopharmaceuticals.
22	**Q:** Does the Basic Imaging Agent Administration need any additional attributes to make Q/R more effective? The design intent is that the pump will store the above SOP Instance directly to the modality **A:** Closed. As Basic Performed object has been agreed to be removed.
23	**Q:** Are the Enhanced Contrast/Bolus Module, Enhanced PET Isotope module and the Interventional modules sufficient for recording radio-pharmaceutical administration? (For PET/SPECT/Nucmed imaging) **A:** Closed. Irrelevant, since it has been agreed to remove radiopharmaceuticals.
24	**Q:** Is "DCID (xx13) GFR Measurements", a comprehensive representation appropriate to convey GFR measurement and methods? **A:** Closed. See CP-1589.
25	**Q:** For Planned Imaging Agent Administration TID xx01, do we need TID 1003 or person observer identification? How do we communicate who wrote or authored the plan? **A:** Closed. Author for planned object is the one who plans it, which is already being captured.
26	**Q:** The value set constraint column of concept EV (111546, DCM, "Used Imaging Agent Type") under TID xx05 "Imaging Agent Administration": Does the defined CIDs already list all available Oral contrast-agents? **A:** Closed. When new agents are invented, we'll add them to the CID.
27	Q: 126203 Radiopharmaceutcial Incubation time concept is removed from Defined / Planned template. **A:** Closed. Irrelevant since it has been agreed to remove radiopharmaceuticals.

28	**Q.** The concept EV (newcode512, 99SUP164, Rationale for Administering Imaging Agent) under Planned Imaging Agent Administration TID xx01: a. Is there an advantage in adding this concept? Should we get rid of this? b. Should this also be coded and what codes should be used? c. How does this relate to AAPM protocol "diagnostic task" (e.g., "Identify pulmonary embolus", etc.) **A:** Concept not necessary, removed it. Closed.
29	**Q:** Is the concept "Equivalent meaning of concept name" (EV (121050, DCM, "Equivalent meaning of concept name")) under "TID xx03 Patient Risk-Factor Context related to Imaging Agents ", a comprehensive representation appropriate to convey GFR measurement and methods? **A:** Above concept and TID in question no longer proposed as a consequence of re-using TID 10024 instead.
30	**Q: Should this supplement address Radiopharmaceutical?** **A:** No. The activity details are recorded in R-RDSR and are sufficient, and if necessary can be augmented with injection details that can be extracted by an injector from an R-RDSR (future work item if sufficient interest). Closed.
31	Is UPC Code is the correct code to identify a consumable related to Imaging Agent administration? Added UDI. Closed.
32	Is the concept "Use of intra-arterial injection papaverine" limited to intra-arterial? No feedback received. Closed.
33	Do we need TID 1003 or person observer identification for Defined Imaging Agent Administration TID xx16, How do we communicate who wrote or authored the plan? A: The defined substance administration SR IOD has been taken out of this supplement 164. Only patient planned and performed reports are in this supplement. Out of scope. Closed.
34	Under TID xx05, Imaging Agent Information table, do we need concept EV (newcode546, 99SUP164, "Imaging Agent Order Date")? This refers to when the physician ordered it. No, not trying to capture original order date. Closed.
35	Does "CID 3746 Percutaneous Entry Site" cover for all anatomical injection sites for contrast administration, in relation to the concept EV (G-C340, SRT, "Route of Administration")? No feedback received. Closed.

36	Does “DTID (1005) Procedure Context” template required in the root templates? Is the context about the procedure covered in the header sufficient? Yes, it’ needed. No, the header is insufficient. Closed.
37	Do we need to report the risk factors in the performed and planned instance? A: Risk factors are already being covered under the proposed modification of TID 10024 Patient characteristics. Closed.
38	The Concept, EV(newcode806, 99SUP164, “Imaging Agent Consumable Product Code”)Should it be generic product code? How does this related to the UDI? A: Concept no longer proposed. Using UDI. Closed.
39	See TID xx05 Imaging Agent Information: Should we constrain the units for Concentration? No. Closed.
40	Does any modality have a strong need for the Basic object? The supplement has the SR object. CT and Angio do SR for RDSR. US does SR for measurements. PET is adopting SR for Radiopharmaceutical injections. Early drafts of the supplement included a Basic object with limited summary details in attributes rather than SR. Keeping a Basic object would duplicate information and require support of additional SOP classes. No longer relevant. Closed.
41	Are these concept codes under CID xx19 “Imaging Agent Administration Consumable Container Type “, too generic? Or should we make a new code? - SRT code A-27500 for “Bottle” - SRT code R-FDEB9 for “Syringe” - NCIt code R-FEEFF for “Cartridge No feedback received. Closed.
42	Is a waveform appropriate for programmed plan? Will the automatic injection system want a waveform? A: A waveform represents the plot of pressure or flowrate readings against time of a delivered administration. There is no real use for it currently for a programmed plan and therefore the automated injector does not need it. Out of Scope. Closed.

43	Is the following acceptable? This report is unable to report an adverse event separately from a completed administration report. If the adverse events were detected during the administration, it is captured in the administration report. Some adverse events are detected after the completion of administration report, therefore there is no DICOM object to report those events. Yes, there are separate adverse event tracking systems that are not expected to use DICOM. Closed.
44	What is the best way to handle non-patient specific plans (e.g., Clinical trial plan)? A:The defined substance administration SR IOD has been taken out of this supplement 164. Only patient planned and performed reports are in this supplement. Should they be part of the device protocol (like CT Protocols)? Should they be separate? Out of Scope. Closed.
45	Do we want to permit other equivalent codes instead of DICOM codes under TID xx05 Rows 2 and 3? No, a mapping to the codes from barcode or user entry is needed anyway, so might as well have one stable target set. Closed.
46	When you have a cartridge that is pre-filled with an agent, should this be described as an accessory, that has a property that it contains a particular agent ? Or should it be described as an accessory and separately the agent describes as an agent volume. The latter is chosen. Closed.
47	Do we need to add CID xx1 “Imaging Agent Administration Adverse Events” into CID 9300 “Procedure discontinuation reasons”? Yes. Closed.
48.	Not all consumable are really consumables (For e.g., Re-usable syringe as it’s not “Consumed”…) What should be the name of this template? A: We will use “Consumables” until we find a better name for it.

110

Changes to NEMA Standards Publication PS 3.2

Digital Imaging and Communications in Medicine (DICOM)

Part 2: Conformance

Item #01: Add new SOP Classes in Table A.1-2

Table A.1-2
UID VALUES

UID Value	UID NAME	Category
…		
1.2.840.10008.5.1.4.1.1.88.xx3	**Planned Imaging Agent Administration SR Storage SOP Class**	**Transfer**
1.2.840.10008.5.1.4.1.1.88.xx4	**Performed Imaging Agent Administration SR Storage SOP Class**	**Transfer**
…		

Changes to NEMA Standards Publication PS 3.3

Part 3: Information Object Definitions

Add new SR IOD of PS 3.3 A.35:

A.35.X3 Planned Imaging Agent Administration SR Information Object Definition

A.35.X3.1 Planned Imaging Agent Administration SR Information Object Description

The Planned Imaging Agent Administration SR IOD is the plan for administering imaging agent material to a specific patient during an imaging study.

A.35.X3.2 Planned Imaging Agent Administration SR IOD Entity-Relationship Model

This IOD uses the E-R Model in Section A.1.2, with only the SR Document IE below the Series IE. The Frame Reference IE is not a component of this IOD.

A.35.X3.3 Planned Imaging Agent Administration SR IOD Module Table

Table A.35.X3-1
PLANNED IMAGING AGENT ADMINISTRATION SR IOD MODULES

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
	Clinical Trial Subject	C.7.1.3	U
Study	General Study	C.7.2.1	M
	Patient Study	C.7.2.2	U
	Clinical Trial Study	C.7.2.3	U
Series	SR Document Series	C.17.1	M
	Clinical Trial Series	C.7.3.2	U
Equipment	General Equipment	C.7.5.1	M
	Enhanced General Equipment	C.7.5.2	M
Document	SR Document General	C.17.2	M
	SR Document Content	C.17.3	M
	SOP Common	C.12.1	M

A.35.X3.3.1 Planned Imaging Agent Administration SR IOD Content Constraints

A.35.X3.3.1.1 Template

The document shall be constructed from TID (xx01) Planned Imaging Agent Administration invoked at the root node.

A.35.X3.3.1.2 Value Type

Value Type (0040,A040) in the Content Sequence (0040,A730) of the SR Document Content Module is constrained to the following Enumerated Values (see Table C.17.3-7 for Value Type definitions):

TEXT
CODE
NUM
DATETIME
DATE
TIME
UIDREF
PNAME

CONTAINER

A.35.X3.3.1.3 Relationship Constraints

Relationships between content items in the content of this IOD shall be conveyed in the by-value mode. Table A.35.X3-2 specifies the relationship constraints of this IOD. See Table C.17.3-8 for Relationship Type definitions.

Table A.35.X3-2
RELATIONSHIP CONTENT CONSTRAINTS FOR PLANNED IMAGING AGENT ADMINISTRATION SR IOD

Source Value Type	Relationship Type (Enumerated Values)	Target Value Type
CONTAINER	CONTAINS	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME, CONTAINER.
TEXT, CODE, NUM, CONTAINER	HAS OBS CONTEXT	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME
CONTAINER, NUM	HAS ACQ CONTEXT	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME, CONTAINER.
any type	HAS CONCEPT MOD	TEXT, CODE[1]
TEXT, CODE, NUM	HAS PROPERTIES	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME, CONTAINER.
PNAME	HAS PROPERTIES	TEXT, CODE, DATETIME, DATE, TIME, UIDREF, PNAME
TEXT, CODE, NUM	INFERRED FROM	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME, CONTAINER.

Note:

1. The HAS CONCEPT MOD relationship is used to modify the meaning of the concept name of a parent node (or Source Content Item), with a modifier or qualifier in a child (target node) to provide a more descriptive explanation, a different coded language translation, or to define a post-coordinated concept.

A.35.X4 Performed Imaging Agent Administration SR Information Object Definition

A.35.X4.1 Performed Imaging Agent Administration SR Information Object Description

The Performed Imaging Agent Administration SR IOD describes the imaging agent delivery whether manual methods or automated power-injector devices were used. It includes a reference to the Planned Imaging Agent Administration Procedure SR SOP instance if based on a plan.

A.35.X4.2 Performed Imaging Agent Administration SR IOD Entity-Relationship Model

This IOD uses the E-R Model in Section A.1.2, with only the SR Document IE below the Series IE.

A.35.X4.3 Performed Imaging Agent Administration SR IOD Module Table

Table A.35.X4-1
PERFORMED IMAGING AGENT ADMINISTRATION SR IOD MODULES

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
	Clinical Trial Subject	C.7.1.3	U
Study	General Study	C.7.2.1	M
	Patient Study	C.7.2.2	U
	Clinical Trial Study	C.7.2.3	U
Series	SR Document Series	C.17.1	M
	Clinical Trial Series	C.7.3.2	U
Frame of Reference	Synchronization	C.7.4.2	M
Equipment	General Equipment	C.7.5.1	M
	Enhanced General Equipment	C.7.5.2	M
Document	SR Document General	C.17.2	M
	SR Document Content	C.17.3	M
	SOP Common	C.12.1	M

A.35.X4.3.1 Performed Imaging Agent Administration SR IOD Content Constraints

A.35.X4.3.1.1 Template

The document shall be constructed from TID (xx10) Performed Imaging Agent Administration invoked at the root node.

A.35.X4.3.1.2 Value Type

Value Type (0040,A040) in the Content Sequence (0040,A730) of the SR Document Content Module is constrained to the following Enumerated Values (see Table C.17.3-7 for Value Type definitions):

TEXT
CODE
NUM
DATETIME
DATE
TIME
UIDREF

PNAME
COMPOSITE
IMAGE
WAVEFORM
CONTAINER

Commented [UT1]: Needed here because of TID 3990 uses it.

A.35.X4.3.1.3 Relationship Constraints

Relationships between content items in the content of this IOD shall be conveyed in the by-value mode. Table A.35.X4-2 specifies the relationship constraints of this IOD. See Table C.17.3-8 for Relationship Type definitions.

Table A.35.X4-2
RELATIONSHIP CONTENT CONSTRAINTS FOR PERFORMED IMAGING AGENT ADMINISTRATION SR IOD

Source Value Type	Relationship Type (Enumerated Values)	Target Value Type
CONTAINER	CONTAINS	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME, COMPOSITE[1], IMAGE[1], WAVEFORM[1], CONTAINER.
TEXT, CODE, NUM, CONTAINER	HAS OBS CONTEXT	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME, COMPOSITE[1]
CONTAINER, IMAGE[1], WAVEFORM[1], COMPOSITE[1], NUM	HAS ACQ CONTEXT	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME, CONTAINER.
any type	HAS CONCEPT MOD	TEXT, CODE[2]
TEXT, CODE, NUM	HAS PROPERTIES	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME, IMAGE[1], WAVEFORM[1], COMPOSITE[1], CONTAINER.
PNAME	HAS PROPERTIES	TEXT, CODE, DATETIME, DATE, TIME, UIDREF, PNAME
TEXT, CODE, NUM	INFERRED FROM	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME, IMAGE[1], WAVEFORM[1], COMPOSITE[1], CONTAINER.

Notes: 1. The SOP Classes to which an IMAGE or WAVEFORM or COMPOSITE Value Type may refer, is documented in the Conformance Statement for an application (see PS 3.2 and PS 3.4).

2. The HAS CONCEPT MOD relationship is used to modify the meaning of the concept name of a parent node (or Source Content Item), with a modifier or qualifier in a child (target node) to provide a more descriptive explanation, a different coded language translation, or to define a post-coordinated concept.

Commented [UT2]: Hologic comment PS3.3 #2

Inserted

Changes to NEMA Standards Publication PS 3.4

Digital Imaging and Communications in Medicine (DICOM)

Part 4: Service Class Specifications

Add new SOP Class to PS 3.4 Annex B tables:

B.5 STANDARD SOP CLASSES

The SOP Classes in the Storage Service Class identify the Composite IODs to be stored. Table B.5-1 identifies Standard SOP Classes.

Table B.5-1
STANDARD SOP CLASSES

SOP Class Name	SOP Class UID	IOD Specification (defined in PS 3.3)
…	…	…
Planned Imaging Agent Administration SR Storage	**1.2.840.10008.5.1.4.1.1.88.xx3**	**Planned Imaging Agent Administration SR IOD**
Performed Imaging Agent Administration SR Storage	**1.2.840.10008.5.1.4.1.1.88.xx4**	**Performed Imaging Agent Administration SR IOD**
…	…	…

…

Changes to NEMA Standards Publication PS 3.6

Digital Imaging and Communications in Medicine (DICOM)

Part 6: Data Dictionary

Add new SOP Class to PS 3.6 Table A-1:

…	…	…	...
1.2.840.10008.5.1.4.1.1.88.xx3	**Planned Imaging Agent Administration SR Storage**	**SOP Class**	**PS 3.4**
1.2.840.10008.5.1.4.1.1.88.xx4	**Performed Imaging Agent Administration SR Storage**	**SOP Class**	**PS 3.4**
…	…	…	…

Changes to NEMA Standards Publication PS 3.16

Digital Imaging and Communications in Medicine (DICOM)

Part 16: Content Mapping Resource

Add definition to Section 3 as shown

Imaging Agent A substance administered to improve the imaging of specific organs, tissues, diseases and physiological functions [Adapted from Wikipedia "https://en.wikipedia.org/wiki/Imaging_agent"].

Notes: 1. Imaging agents include iodinated X-Ray and gadolinium-based MR contrast agents.
2. Saline flush is not an imaging agent but may be administered in conjunction with imaging agents.
3. Air used as a negative contrast agent is an imaging agent.

Add new Section to Annex A of PS 3.16:

PLANNED IMAGING AGENT ADMINISTRATION SR IOD TEMPLATES

The templates that comprise the Planned Imaging Agent Administration are interconnected as in Figure A.x-1

Commented [UT3]: Hologic comment PS3.16 #2

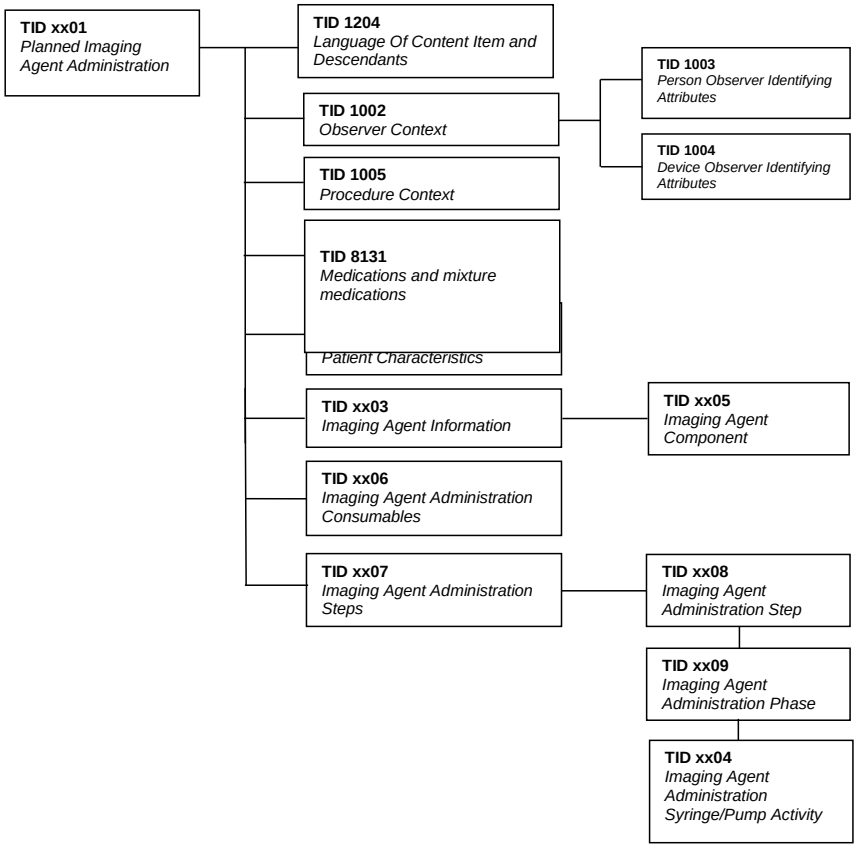


Figure A.x-1: Planned Imaging Agent Administration SR IOD Template Structure

Add TID xx01 as shown.

TID xx01 Planned Imaging Agent Administration

This template describes single administration plan.

This template defines a container (the root) with subsidiary content items, each of which corresponds to a single Imaging Agent Administration that is planned.

Commented [UT4]: Hologic comment #3

Note: If a planned SR is a modification of a previous planned SR, it can reference the previous plan using the Predecessor Documents Sequence (0040,A360).

TID xx01
Planned Imaging Agent Administration
Type: Extensible Order: Non-Significant Root :Yes

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (newcode807, 99SUP164, "Planned Imaging Agent Administration")	1	M		
2	>	HAS CONCEPT MOD	INCLUDE	DTID (1204) Language Of Content Item and Descendants	1	U		
3	>	HAS OBS CONTEXT	INCLUDE	DTID (1002) Observer Context	1-n	M		
4	>	HAS OBS CONTEXT	INCLUDE	DTID (1005) Procedure Context	1	M		
5	>	CONTAINS	INCLUDE	DTID (8131) "Medications and mixture medications"	1-n	U		$DrugAdministered = DCID (xx12) Pre-Medication for Imaging Agent Administration
6	>	CONTAINS	INCLUDE	DTID (10024) Imaging Agent Administration Patient Characteristics	1	U		
7	>	CONTAINS	INCLUDE	DTID (xx03) Imaging Agent Information	1-n	M		
8	>	CONTAINS	TEXT	EV (121106, DCM, "Comment")	1	U		
9	>	CONTAINS	INCLUDE	DTID (xx06) Imaging Agent Administration Consumables	1-n	U		
10	>	CONTAINS	INCLUDE	DTID (xx07) Imaging Agent Administration Steps	1	M		

Content Item Descriptions

Row 3	Author of the plan.
Row 5	Describes medications administered prior to the procedure. E.g., for contrast reaction prophylaxis. Not intended for pharmaceutical stress agents.
Row 8	General comments about the planned imaging agent administration. It is intended for such things as a summary of the content of the plan, additional instructions related to administration of the plan, and concepts that cannot be expressed by structured features of the plan.
Row 9	The consumables that would be needed to execute the plan. e.g., a catheter of a particular size.

Add TID xx02 as shown.

Commented [UT5]: Done throughout the doc. Hologic comment PS3.16 #1

TID xx02 Pre-Medication For Imaging Agent Administration

This template describes relevant pre-medications used prior to the Imaging Agent Administration.

TID xx02
Pre-Medication For Imaging Agent Administration
Type: Extensible Order: Non-Significant Root: No

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (123012, DCM, "Pre-Medication")	1	M		
2	>	CONTAINS	CODE	EV (122083, DCM, "Drug administered")	1	M		DCID (xx12) Pre-Medication for Imaging Agent Administration
2b	>	CONTAINS	CODE	EV (113510, DCM, "Drug Product Identifier")	1	U		
3	>>	HAS PROPERTIES	TEXT	EV (111529, DCM, "Brand Name")	1	U		
4	>	CONTAINS	NUM	DCID (3410) Numeric Parameters of Drugs/Contrast	1-n	U		
5	>	CONTAINS	CODE	EV (G-C340, SRT, "Route of Administration")	1	U		DCID (11) Route of Administration
6	>	CONTAINS	DATETIME	EV (122081, DCM, "Drug Start")	1	U		
7	>	CONTAINS	DATETIME	EV (122082, DCM, "Drug End")	1	U		

Content Item Descriptions

Row 2b	Registered drug establishment code for the product.. Equivalent codes can be encoded in this item using the Equivalent Code Sequence (0008,0121). See PS 3.3 Section 8.9..

Modify TID 10024 as shown and update figure A-17 to use the new name

Note CP-1589 is also making modifications to this table that are relevant.

TID 8131 Medications and Mixture Medications

This template encodes a description of medications (including but not limited to anesthetic agents) used during a procedure (e.g.,anesthesia for imaging of research small animals).

Table TID 8131. Parameters

Parameter Name	Parameter Usage
$DrugAdministered	Type of drug administered

Type: Extensible

Order: Significant

Root: No

Table TID 8131 Medications and Mixture Medications

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (F-04460, SRT, "Medication given")	1	M		
2	>	CONTAINS	DATETIME	EV (122081, DCM, "Drug start")	1	U		
3	>	CONTAINS	DATETIME	EV (122082, DCM, "Drug end")	1	U		
4	>	CONTAINS	CODE	EV (G-C340, SRT, "Route of administration")	1	M		DCID 11 "Route of Administration"
5	>	CONTAINS	CONTAINER	EV (R-40826, SRT, "Mixture")	1-n	M		
6	>>	CONTAINS	CODE	EV (122083, DCM, "Drug administered")	1	MC	XOR Row 7	$DrugAdministered
7	>>	CONTAINS	TEXT	EV (122083, DCM, "Drug administered")	1	MC	XOR Row 6	
8	>>	CONTAINS	CODE	EV (111516, DCM, "Medication Type")	1	MC	IFF $ DrugAdministered= DCID 623 "Medication for Small Animal Anesthesi	DCID 621 "Medication Type Code Type for Small Animal Anesthesia"

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
							a”	
11	>>	CONTAINS	CODE	EV (113510, DCM, "Drug Product Identifier”)	1	U		
12	>>>	HAS PROPERTIES	TEXT	EV (111529, DCM, “Brand Name”)	1	U		
13	>>	CONTAINS	NUM	DCID (3410) Numeric Parameters of Drugs/Contrast	1-n	U		

315

Content Item Descriptions

Row 1	AQI Medication type and element correspond to (F-04460, SRT, "Medication given") (situation). (See TID 3806 Cath Procedure).
Rows 2-3	AQI DoseStart and DoseEnd elements correspond to (122081, DCM, "Drug start") and (122082, DCM, "Drug end") respectively. (See CID 3409 Administration of Drugs/Contrast). If the medication is delivered as a bolus, the end time is omitted.
Row 4	AQI MedicationRoute corresponds to (G-C340, SRT, "Route of administration"). The existing CID 11 “Route of Administration” contains a relevant subset of concepts for the enumerated values of AQI MedicationRouteCodeType.
Row 5	The AQI schema allows the Medication type not only to describe medications with a single component, but also to add MixtureMedications children, each of which is encoded following a similar pattern to the contents of Medication, though the start and end time and route of administration are shared. This had been modeled by allowing every medication to have one or more mixture children. For medications that are not a mixture, a single instance of this row defines the medication (even though the mixture container is still used).
Rows 6, 7	AQI MedicationName and MixtureMedicationName elements correspond to (122083, DCM, "Drug administered"). (See TID 3806 Cath Procedure). The medication (e.g., anesthesia agent) can be described with a code or text, e.g., (F-61B0A, SRT, "Isoflurane") or "isoflurane".
Row 9	Both AQI MedDose (or MixtureMedDose) and DoseUnits (or MixtureDoseUnits) elements are combined in one content item. Units are required to be encoded as UCUM but are not otherwise constrained.
Row 10	Both AQI MedConcentration (or MixtureMedConcentration) and MedConcentrationUnit (or MixtureMedConcentrationUnit) elements are combined in one content item. Units are required to be encoded as UCUM but are not otherwise constrained.
Row 11	Registered drug establishment code for the product. Equivalent codes can be encoded in this item using the Equivalent Code Sequence (0008,0121). See PS 3.3 Section 8.9.

Modify TID 10024 as shown and update figure A-17 to use the new name

Note CP-1589 is also making modifications to this table that are relevant.

TID 10024 ~~Radiopharmaceutical~~ Imaging Agent Administration Patient Characteristics

This Template describes the characteristics of the patient related to imaging agent administration that are specific to the current clinical presentation (visit). **In the case of radiopharmaceuticals**, the characteristics noted may affect the activity received, and how dose is calculated for the patient. Patient Characteristic concepts in this Template, which may replicate attributes in the Patient Study Module, are included here as possible targets of by-reference relationships from other Content Items in the SR tree.

Type: Extensible

Order: Significant

Root: No

Table TID 10024 ~~Radiopharmaceutical~~ Imaging Agent Administration Patient Characteristics

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (121118, DCM, "Patient Characteristics")				
2	>	CONTAINS	CODE	EV (109054, DCM, "Patient state")	1-n	U		DCID (10045) "Radiopharmaceutical Patient State" **DCID (xx9) "Imaging Agent Administration Patient State"**
3	>	CONTAINS	NUM	EV (121033, DCM, "Subject Age")	1	U		UNITS = DCID 7456 "Units of Measure for Age"
…								

TID xx03 Imaging Agent Information

This template describes an imaging agent which may be a single component or a mix of multiple components used in a single syringe or pump.

Commented [UT6]: Hologic's comment #4: Renaming TID 10024 requires additional changes in PS 3.16: update Figure A-17 & update TID 10021, row 5.

We are already proposed the change in title. Is that enough?

WG-06 has to decide how to handle.

TID xx03
Imaging Agent Information
Type : Extensible Order : Non-Significant Root : No

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (newcode541, 99SUP164, "Imaging Agent Information")	1	M		
2	>	CONTAINS	TEXT	EV(newcode3000, 99SUP164, "Imaging Agent Index")	1	M		
2a	>	CONTAINS	CODE	EV(newcode553, 99SUP164, "Imaging Agent Warmed")	1	M		DCID 230 "Yes-No"
3	>	CONTAINS	CONTAINER	EV(newcode6000, 99SUP164, "Imaging Agent Component Usage")	1-n	M		
4	>>	CONTAINS	INCLUDE	DTID (xx05) Imaging Agent Component	1	M		
5	>>	CONTAINS	NUM	EV (newcode1103, 99SUP164, "Component Volume")	1	MC	IF 2 or more items of row 3 are present	UNITS = EV (ml, UCUM, "ml")

Commented [UT7]: My suggested solution

Also addressed by Hologic comment #5

Content Item Descriptions

Row 2	Uniquely, within the scope of the root container, identifies the imaging agent contained in a syringe or pump.
Row 3	A single imaging agent component, or a mixture of multiple imaging agent components, used to build a custom mixture of contrast agent, filled in a single syringe or pump. For imaging agents that are not a mixture, a single instance of this row defines the imaging agent component.
Row 5	Estimated volume of the imaging agent component.

Commented [UT8]: Just fixes according to my proposed solution

Add TID xx04 as shown.

TID xx04 Imaging Agent Administration Syringe/Pump Phase Activity

This template describes a single Syringe/Pump activity as part of the single imaging administration phase. A phase activity is the lowest level of the imaging agent delivery model.

350

TID xx04
Imaging Agent Administration Syringe/Pump Phase Activity
Type : Extensible Order : Non-Significant Root : No

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (newcode1100, 99SUP164, "Imaging Agent Administration Syringe/Pump Phase Activity")	1	M		
2	>	CONTAINS	TEXT	EV (newcode3001, 99SUP164, "Referenced Imaging Agent Index")	1	M		Shall be a value of Row 2 in TID (xx03).
3	>	CONTAINS	NUM	EV (122091, DCM, "Volume Administered"	1	M		UNITS = EV (ml, UCUM, "ml")
4	>	CONTAINS	NUM	EV (newcode598, 99SUP164, "Starting Flow Rate of administration")	1	M		UNITS = EV (ml/s, UCUM "ml/s")
5	>	CONTAINS	NUM	EV (newcode599, 99SUP164, "Ending Flow Rate of administration")	1	MC	IF Row 7 = EV (newcode2402, DCM, "Linear Curve")	UNITS = EV (ml/s, UCUM "ml/s")
6	>	CONTAINS	NUM	EV (newcode597, 99SUP164,"Rise Time")	1	UC	IF root Concept Name Code Sequence = (newcode809, 99SUP164,"Performed Imaging Agent Administration")	UNITS = EV (s, UCUM,"s")
7	>	CONTAINS	CODE	EV (newcode600, 99SUP164,"Bolus Shaping Curve")	1	U		DCID (xx24) "Bolus Shaping Curves"
8	>>	HAS PROPERTIES	TEXT	EV(111002, DCM,"Algorithm Parameters")	1-n	U		
9	>	CONTAINS	NUM	EV (newcode1110, 99SUP164, "Peak Flow Rate in Phase Activity")	1	UC	IF TID (xx08) Row 6 = EV (newcode081, DCM, "Automated Injection") AND IFF root Concept Name Code Sequence = (newcode809, 99SUP164, "Performed Imaging Agent Administration")	UNITS = EV (ml/s, UCUM "ml/s")
10	>	CONTAINS	NUM	EV (newcode595, 99SUP164,"Initial Volume of Imaging Agent in Container")	1	UC	IFF root Concept Name Code Sequence = (newcode809, 99SUP164,"Performed Imaging Agent Administration")	UNITS = EV (ml, UCUM, "ml")

11	>	CONTAINS	NUM	EV (newcode596, 99SUP164,"Residual Volume of Imaging Agent in Container")	1	UC	IFF root Concept Name Code Sequence = (newcode809, 99SUP164,"Performed Imaging Agent Administration")	UNITS = EV (ml, UCUM, "ml")
12	>	CONTAINS	DATETIME	EV (111526, DCM, "DateTime Started"	1	MC	IFF root Concept Name Code Sequence = (newcode809, 99SUP164,"Performed Imaging Agent Administration")	
13	>	CONTAINS	NUM	EV (C0449238, UMLS, "Duration")	1	MC	IF root Concept Name Code Sequence = (newcode809, 99SUP164,"Performed Imaging Agent Administration")	UNITS = EV (s, UCUM, "s")

Content Item Descriptions

Row 3	Volume administered by this syringe or pump.
Row 7	Shape of the flow rate from the beginning rate to the end rate of the administration. This will typically be a vendor specific code. The code meaning of the concept name should describe the type and intent of the curve.
Row 8	Any parameters used to generate the curve defined in Row 7.
Row 9	Peak value of the flow rate of this syringe or pump activity.
Row 12	Datetime this individual syringe or pump activity actually started.
Row 13	Duration of this individual syringe or pump activity.

Add TID xx05 as shown.

TID xx05 Imaging Agent Component

This template describes the Imaging Agent component. The brand and packaging information can be referenced under TID xx06 consumables.

TID xx05
Imaging Agent Component
Type : Extensible Order : Non-Significant Root : No

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (newcode1102, 99SUP164, "Imaging Agent Component")	1	M		
								(0

Commented [UT9]: Due to Kevin's comment #5 this is no longer true.

Commented [UT10]: GREEN marked properties relies on Kevin's comment #5. We separate consumables from agents. So agents specific properties were moved from TID (xx06) to TID (xx05). Also all properties for product and logistic description / handling were copied to TID (xx05).

3	>	CONTAINS	CODE	EV (122083, DCM, "Drug administered")	1	M		DCID (12) Radiographic Contrast Agent OR DCID (3204) Stress Agents OR DCID (xx20) Flush
4	>	CONTAINS	CODE	EV (G-C52F, SRT, "Active Ingredient")	1	U		DCID (13) Radiographic Contrast Agent Ingredient
4a	>	CONTAINS	CODE	EV (113510, DCM, "Drug Product Identifier")	1	M		
6	>	CONTAINS	NUM	EV (122093,"DCM", "Concentration")	1	U		
7	>	CONTAINS	NUM	EV (282258000, SRT, "Molarity")	1	U		UNITS = EV (mmol/L, UCUM,"mmol/L")
8	>	CONTAINS	CODE	EV (62970001, SRT, "Osmolarity")	1	U		DCID (xx26) Low-High Only
9	>	CONTAINS	NUM	EV (126380, DCM, "Contrast Longitudinal Relaxivity")	1	U		UNITS = EV(L/mmol/s, UCUM, "L/mmol/s")
9a	>	CONTAINS	NUM	EV (newcode554126380, 99SUP164, "Contrast Transverse Relaxivity")	1	U		UNITS = EV(L/mmol/s, UCUM, "L/mmol/s")
10	>	CONTAINS	NUM	EV (newcode550, 99SUP164, "Osmolality at 37C")	1	U		UNITS = EV (mosm/kg, UCUM, "mosmol/kg")
11	>	CONTAINS	NUM	EV (newcode551, 99SUP164, "Osmolarity at 37C")	1	U		UNITS = EV (mmol/L UCUM,"mmol/L")
12	>	CONTAINS	NUM	EV (newcode552, 99SUP164, "Viscosity at 37C")	1	U		UNITS = EV (mosm/kg[H2O], "UCUM", "mosm/kg[H2O]")
13	>	CONTAINS	CODE	EV (newcode802, 99SUP164, "Imaging Agent Administration Pharmaceutica l Packaging Type")	1	M		DCID (xx18) Imaging Agent Administration Pharmaceutical Packaging
14	>	CONTAINS	NUM	EV (newcode800, DCM, "Imaging Agent Container Volume")	1	U		UNITS = EV (ml, UCUM, "ml")
17	>	CONTAINS	TEXT	EV (121147, DCM, "Billing Code")	1	U		
18	>	CONTAINS	TEXT	EV (121145, DCM, "Description of Material")	1	U		
19	>	CONTAINS	DATE	EV (C70854, NCIt, "Medical Product Expiration Date")	1	U		
20	>	CONTAINS	TEXT	EV (C0947322, UMLS, "Manufacturer Name")	1	U		
21	>	CONTAINS	TEXT	EV (111529, DCM, "Brand Name")	1	U		

Commented [UT11]: Enhance to any pharmaceutical product which may be appropriate from the physician's point of view, but at least to stress agents.

Commented [UT12]: Hologic comment #6

Commented [UT13]: If row 3 is enhanced to have also DCID 3204 there may be also other active ingredients. Suggestion: Make UC with condition on row 3 having a value from DCID (12).

Commented [UT14]: Hologic coment #7

Commented [UT15]: Hologic coment #7

Commented [SB16]: UCUM Source: http://unitsofmeasure.org/ucum.html

Commented [SB17]: Start here for Wednesday March 21 2018 session.

22	>	CONTAINS	CODE	EV (newcode813, 99SUP164, “Barcode Number”)	1-n	UC	IFF root Concept Name Code Sequence = (newcode807, 99SUP164,“Planned Imaging Agent Administration”)	
23	>	CONTAINS	CODE	EV (newcode813, 99SUP164, “Barcode Number”)	1	UC	IFF root Concept Name Code Sequence = (newcode809, 99SUP164,“Performed Imaging Agent Administration”)	
24	>	CONTAINS	TEXT	EV (121148, DCM, “Unit Serial Identifier”)	1	U		
25	>	CONTAINS	TEXT	EV (121149, DCM, “Lot Identifier”)	1	U		
26	>	CONTAINS	CODE	EV (128739, DCM, "UDI")	1	U		

Content Item Descriptions

Row 3	The drug administered includes contrast agents, stress agents, flush and other agents.
Row 6	Concentration of the active ingredient of the contrast media.
Row 9	Relaxivity at 37C at B0 field strength.
Row 9a	Relaxivity at 37C at B0 field strength.
Row 17	The billing codes for material used for imaging agent administration procedure. It does not include performance and interpretation of the imaging.
Row 20	Name of the manufacturer of the pharmaceutical.
Row 22,23	The coding scheme designator of the concept value describes the type of code. E.g., UPC, EAN, GTIN. Multiple items are permitted for planned imaging agent administration since multiple container sizes may be allowed.

Commented [UT18]: Hologic comment #7

To be verified by Sridhar.

Add TID xx06 as shown.

TID xx06 Imaging Agent Administration Consumable

This template describes a material or supply used in the course of an Imaging Agent administration procedure. This includes both the imaging agents and container consumables such as needles, cartridges, tubing, cannulas, catheters, etc. This template may describe reusable materials eg., syringes.

For the planned administration, this is the expected consumables. For the performed administration, this describes what was actually used.

TID xx06
Imaging Agent Administration Consumable
Type : Extensible Order : Non-Significant Root : No

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (newcode801, 99SUP164, “Imaging Agent Administration Consumable”)	1	M		

Commented [UT19]: RED marked properties relies on Kevin’s comment #5. We separate consumables from agents. So agents specific properties were moved to TID (xx05) (with the exception of row 3). Also all properties for product and logistic description / handling were copied to TID (xx05).

2	>	CONTAINS	CODE	EV (newcode802, 99SUP164, “Imaging Agent Administration Consumable Type”)	1	M		DCID (xx19) Imaging Agent Administration Consumables
4	>	CONTAINS	NUM	EV (121146, DCM, “Quantity of Material”)	1	U		
5	>	CONTAINS	NUM	EV (newcode800, DCM, “Imaging Agent Container Volume”)	1	U		UNITS = EV (ml, UCUM, “ml”)
6	>	CONTAINS	CODE	EV (newcode805, DCM, “Imaging Agent Administration Container Fill Type”)	1	U		DCID (xx3) Imaging Agent Administration Container Fill Type
7	>	CONTAINS	TEXT	EV (121147, DCM, “Billing Code”)	1	U		
8	>	CONTAINS	TEXT	EV (121145, DCM, ”Description of Material”)	1	U		
9	>	CONTAINS	DATE	EV (C70854, NCIt, “Medical Product Expiration Date”)	1	U		
10	>	CONTAINS	NUM	EV (111467, DCM, “Needle Length”)	1	U	IF Row 2 = EV (A-26800, SRT, “Catheter”)	UNITS = EV (mm, UCUM, ”mm”)
11	>	CONTAINS	NUM	EV (122319, DCM, “Catheter Size”)	1	MC	IF Row 2 = EV (A-26800, SRT, “Catheter”) AND If Row 12 = EV(A-26836, SRT, “Peripheral intravenous catheter”)	UNITS = DCID (3510) Catheter Size Units
12	>	CONTAINS	CODE	EV (newcode5000, DCM, “Consumable Catheter Type”)	1	MC	IF Row 2 = EV (A-26800, SRT, “Catheter”)	DCID (xx25) Imaging Agent Administration Consumable Catheter Type
13	>	CONTAINS	TEXT	EV (C0947322, UMLS, “Manufacturer Name”)	1	U		
14	>	CONTAINS	TEXT	EV (111529, DCM, “Brand Name”)	1	U		
15	>	CONTAINS	CODE	EV (newcode813, 99SUP164, “Barcode Number”)	1-n	UC	IFF root Concept Name Code Sequence = (newcode807, 99SUP164,“Planned Imaging Agent Administration”)	
16	>	CONTAINS	CODE	EV (newcode813, 99SUP164, “Barcode Number”)	1	UC	IFF root Concept Name Code Sequence = (newcode809, 99SUP164,“Performed Imaging Agent Administration”)	
18	>	CONTAINS	TEXT	EV (121148, DCM, “Unit Serial Identifier”)	1	U		

Commented [UT20]: These chevrons and HAS PROPERTIES pairs seems also sense less, because all items within TID (xx06) seems to be in a flat model.

Commented [UT21]: Hologic comment #8

19	>	CONTAINS	TEXT	EV (121149, DCM, “Lot Identifier”)	1	U		
20	>	CONTAINS	CODE	EV (128739, DCM, "UDI")	1	U		

Content Item Descriptions

Row 3	This index shall be unique within the scope of all inclusions of TID (xx06) Imaging Agent Administration Consumable.
Row 4	Quantity of the imaging agent consumed or quantity of accessories or other consumables used
Row 7	The billing codes for material used for imaging agent administration procedure. It does not include performance and interpretation of the imaging.
Row 13	Name of the manufacturer of the consumable.
Row 15,16	The coding scheme designator of the concept value describes the type of code. E.g., UPC, EAN, GTIN. Multiple items are permitted for planned imaging agent administration since multiple container sizes may be allowed.

Add TID xx07 as shown.

380 **TID xx07 Imaging Agent Administration Steps**

This template provides detailed information on Imaging Agent Administration Steps. It consists of multiple administration steps; a step in turn consists of multiple administration phases.

385 **TID xx07**
Imaging Agent Administration Steps
Type: Extensible Order: Non-Significant Root: No

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (newcode571, 99SUP164, “Imaging Agent Administration Steps”)	1	M		
1a	>	CONTAINS	TEXT	EV (newcode585, 99SUP164, “Imaging Agent Administration Steps Description”)	1	M		
2	>	CONTAINS	INCLUDE	DTID (xx08) Imaging Agent Administration Step	0-n	M		

Commented [UT22]: Possible solution for Hologic comment #11.
Ask WG-06 if we really need it.

Content Item Descriptions

Row 1	Administration Steps / Title or simply an Administration Steps number as text
Row 2	May be empty when no steps were actually performed.

390

Add TID xx08 as shown.

TID xx08 Imaging Agent Administration Step

This template provides detailed information on Imaging Agent Administration step. A step is part of a plan. Steps are usually distinguished from other steps because an operator's intervention is required between steps. Steps are also distinguished when they have different routes of administration. A step may consist of multiple phases.

TID xx08
Imaging Agent Administration Step
Type: Extensible Order: Non-Significant Root: No

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (newcode581, 99SUP164, "Imaging Agent Administration Step")	1	M		
2	>	CONTAINS	TEXT	EV (newcode582, 99SUP164, "Imaging Agent Administration Step Identifier")	1	M		
2a	>	CONTAINS	UIDREF	EV (newcode1114, 99SUP164, "Imaging Agent Administration Step UID")	1	MC	IFF root Concept Name Code Sequence = (newcode809, 99SUP164, "Performed Imaging Agent Administration")	
3	>	CONTAINS	CODE	EV (newcode1119, 99SUP164, "Administration Step Type")	1	M		DCID (xx23) Imaging Agent Administration Step Type
4	>	CONTAINS	NUM	EV (newcode583, 99SUP164, "Administration Delay")	1	U		UNITS = EV (s, UCUM, "s")
5	>	CONTAINS	NUM	EV (newcode584, 99SUP164, "Scan Delay")	1	U		UNITS = EV (s, UCUM, "s")
6	>	CONTAINS	CODE	EV (newcode500, 99SUP164, "Administration Mode")	1	M		DCID (xx8) Imaging Agent Administration Mode
7	>	CONTAINS	NUM	EV (newcode573, 99SUP164, "Pressure Limit")	1	UC	IF Row 6 = EV (newcode081, DCM, "Automated Injection")	UNITS = EV (kPa,UCUM, "kPa")
7a	>	CONTAINS	NUM	EV (newcode574, 99SUP164, "Performed Pressure Maximum")	1	UC	IF Row 6 = EV (newcode081, DCM, "Automated Injection") AND IFF root Concept Name Code Sequence = (newcode809, 99SUP164, "Performed Imaging Agent Administration")	UNITS = EV (kPa,UCUM, "kPa")

8	>	CONTAINS	NUM	EV (newcode810, DCM, “Contrast Volume Limit”)	1	UC	IFF root Concept Name Code Sequence = (newcode807, 99SUP164, “Planned Imaging Agent Administration”)	UNITS = EV (ml,UCUM, “ml“)
9	>	CONTAINS	CODE	EV (G-C340, SRT, "Route of Administration")	1	M		DCID (11) Route of Administration
10	>>	HAS PROPERTIES	CODE	EV(G-C581, SRT, “Site of”)	1	MC	IF Row 9 equals (G-D101, SRT, “Intravenous route”) Or (G-D109, SRT, “Intra-articular route”)	DCID 3746 “Percutaneous Entry Site”
11	>>>	HAS CONCEPT MOD	CODE	EV(G-C171,SRT, ”Laterality”)	1	MC	IF Row 9 has laterality	DCID 244 Laterality
12	>	CONTAINS	INCLUDE	DTID (xx09) Imaging Agent Administration Phase	1-n	M		
13	>	CONTAINS	INCLUDE	DTID (xx20) Imaging Agent Administration Graph	1-n	UC	IF Row 6 = EV (newcode081, DCM, “Automated Injection”) AND IFF root Concept Name Code Sequence = (newcode809, 99SUP164, “Performed Imaging Agent Administration”)	
14	>	CONTAINS	NUM	EV (newcode713, 99SUP164, “Number of Injector Heads”)	1	U		
15	>	CONTAINS	CODE	EV (newcode712, 99SUP164, “Programmable Device”)	1	U		DCID (230) Yes – No
16	>	CONTAINS	CODE	EV (122312, DCM, “Intervention performed”)	1	UC	IF Row 6 = EV (newcode081, DCM, “Automated Injection”) AND IFF root Concept Name Code Sequence = (newcode809, 99SUP164, “Performed Imaging Agent Administration”)	DCID (230) Yes – No
17	>>	CONTAINS	NUM	EV (newcode1105, DCM, “Total Step Volume Administered”)	1	MC	IF Row 16 = Yes	UNITS = EV (ml, UCUM, “ml”)
18	>>	CONTAINS	NUM	EV (newcode1106, DCM, “Total number of manually triggered injections”)	1	MC	IF Row 16 = Yes	

Commented [UT23]: Harry’s comment #1

400 **Content Item Descriptions**

Row 2	Imaging Agent Administration Step Identifier is specified as numeric text string, and shall be treated as the ordinal of the recorded administration step within an administration (i.e., "1" for the first step, "2" for the second, etc.).
Row 2a	This UID represents this physical administration step.
Row 4	Administration delay is the time difference between start of the step and the start of administration of the imaging agent.
Row 5	Scan delay is the time difference between the start of imaging agent administration and the commencement of the scan acquisition (CT, MR or XA).
Row 13	The 1-n relationship here refers to the multiple syringe/pump systems of an injector. There shall be one graph per syringe/pump system.

Add TID xx09 as shown.

TID xx09 Imaging Agent Administration Phase

405 This template provides detailed information on Imaging Agent Administration Phase. A phase is part of the administration step and is not interrupted except under abnormal conditions.

TID xx09
Imaging Agent Administration Phase
Type: Extensible Order: Non-Significant Root: No

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (newcode591, 99SUP164, "Imaging Agent Administration Phase")	1	M		
2	>	CONTAINS	TEXT	EV (newcode592, 99SUP164, "Imaging Agent Administration Phase Identifier")	1	M		
3	>	CONTAINS	CODE	EV (newcode593, 99SUP164, "Imaging Agent Administration Phase Type")	1	MC	IFF TID (xx08) Row 6 = EV (newcode081, DCM, "Automated Administration")	DCID (xx4) Imaging Agent Administration Phase Type
4	>	CONTAINS	INCLUDE	DTID (xx04) Imaging Agent Administration Syringe/Pump Phase Activity	1-n	MC	IFF Row 3 equals (newcode061, DCM, "Automatic Administration Phase")	
5	>	CONTAINS	NUM	EV (newcode1104, DCM, "Total Phase Volume Administered")	1	M		UNITS = EV (ml, UCUM, "ml")

Commented [UT24]: Issue found by UT

6	>	CONTAINS	NUM	EV (newcode1111, 99SUP164, “Peak Flow Rate in Phase”)	1	MC	IF TID (xx08) Row 6 = EV (newcode081, DCM, “Automated Administration”) AND IFF root Concept Name Code Sequence = (newcode809, 99SUP164, “Performed Imaging Agent Administration”)	UNITS = EV (ml/s, UCUM “ml/s”)
7	>	CONTAINS	NUM	EV (newcode1113, 99SUP164, “Peak Pressure in Phase”)	1	MC	IF TID (xx08) Row 6 = EV (newcode081, DCM, “Automated Administration”) AND IFF root Concept Name Code Sequence = (newcode809, 99SUP164, “Performed Imaging Agent Administration”)	UNITS = EV (kPa,UCUM, “kPa“)
8	>	CONTAINS	DATETIME	EV (111526, DCM, “DateTime Started”	1	MC	IFF root Concept Name Code Sequence = (newcode809, 99SUP164, “Performed Imaging Agent Administration”)	
9	>	CONTAINS	NUM	EV (C0449238, UMLS, “Duration”)	1	MC	IF root Concept Name Code Sequence = (newcode809, 99SUP164,“Performed Imaging Agent Administration”)	UNITS = EV (s, UCUM, “s”)

410

Content Item Descriptions

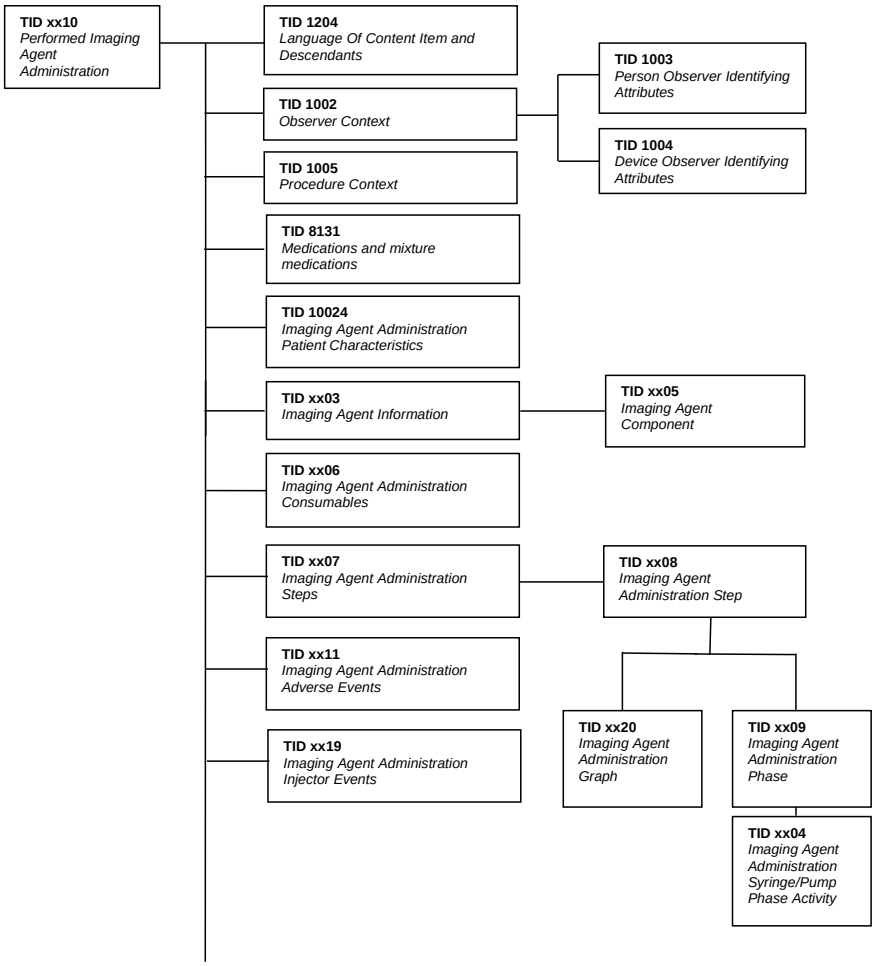
Row 2	Imaging Agent Administration Phase Identifier is specified as numeric text string, and shall be treated as the ordinal of the recorded administration phase within an administration step (i.e., “1” for the first phase, “2” for the second, etc.).
Row 4	There will be one item for each syringe / pump activity that is administering an agent during this phase.
Row 6	Peak value of the total flow rate for all syringes or pumps within this phase.
Row 7	Peak value of the pressure value for any syringe or pump within this phase.
Row 8	Datetime that the earliest syringe/pump starts administering.
Row 9	Total duration of this phase starting from where the earliest syringe/pump starts administering until the last syringe/pump ends administering.

PERFORMED IMAGING AGENT ADMINISTRA TION SR IOD TEMPLATES

The templates that comprise the Performed Imaging Agent Administration are interconnected as in Figure A.- x-2

Commented [UT25]: Hologic comment PS3.16 #2

TID xx10 Performed Imaging Agent Administration



420 Figure A.x-2: Performed Imaging Agent Administration SR IOD Template Structure

This template defines a container (the root) with subsidiary content items, each of which corresponds to a single Imaging Agent Administration delivered. There is a defined recording observer (the system or person responsible for performing the plan).

Note: A performed SR may document a whole planned SR or only a single part of it. A planned SR can be documented by several performed SRs. It is allowed to aggregate several performed SRs of different performing devices on one patient with the same Study Instance UID for a total description of the administration. The aggregated performed SR should reference the previous Performed Imaging Agent Administrations using the Predecessor Documents Sequence (0040,A360). The individual Performed Administrations can be identified by the "Administration Step UID" of TID (xx08) Imaging Agent Administration Step.

Add TID xx10 as shown.

TID xx10
Performed Imaging Agent Administration
Type : Extensible Order : Non-Significant Root: Yes

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (newcode809, 99SUP164, "Performed Imaging Agent Administration")	1	M		
2	>	HAS CONCEPT MOD	INCLUDE	DTID (1204) Language Of Content Item and Descendants	1	U		
3	>	HAS OBS CONTEXT	INCLUDE	DTID (1002) Observer Context	1-n	M		
4	>	HAS OBS CONTEXT	INCLUDE	DTID (1005) Procedure Context	1	U		
5	>	CONTAINS	INCLUDE	DTID (8131) "Medications and mixture medications"	1-n	U		$DrugAdministered = DCID (xx12) Pre-Medication for Imaging Agent Administration
6	>	CONTAINS	INCLUDE	DTID (10024) Imaging Agent Administration Patient Characteristics	1	U		
7	>	CONTAINS	INCLUDE	DTID (xx03) Imaging Agent Information	1-n	M		
8	>	CONTAINS	TEXT	EV(55112-7, LN, "Summary")	1	U		
9	>	CONTAINS	INCLUDE	DTID (xx06) Imaging Agent Administration Consumables	1-n	U		
10	>	CONTAINS	INCLUDE	DTID (xx07) Imaging Agent Administration Steps	1	M		

11	>	CONTAINS	COMPOSITE	EV(newcode1010, 99SUP164, "Planned Imaging Agent Administration SOP Instance")	1	MC	IF this administration was based on a Planned Imaging Agent Administration SOP Instance.	
12	>	CONTAINS	CODE	EV(newcode603, 99SUP164, "Imaging Agent Administration Completion Status")	1	M		DCID (xx17) Imaging Agent Administration Completion Status
13	>	CONTAINS	INCLUDE	DTID (xx11) Imaging Agent Administration Adverse Events	1	U		
14	>	CONTAINS	INCLUDE	DTID (xx19) Imaging Agent Administration Injector Events	1-n	U		
15	>	CONTAINS	NUM	EV(newcode016, 99SUP164, "Total Keep Vein Open Volume Administered"	1	U		UNITS = EV (ml, UCUM, "ml")

Content Item Descriptions

Row 3	Persons and devices responsible for administering the imaging agent. If an automated injector was used, it is recorded here.
Row 7	Describes all imaging agents used.
Row 8	Summary of individual performed injections. e.g., "Administered 30ml of Ultravist using guage22 via LeftAC."
Row 10	Performed plan, this is the actual delivery of the injector recorded after the end of the administration.
Row 11	This reference shall be to the plan that was actually used. Note: If the operator modified a previously stored plan before use, then the modified plan shall be referenced. Stored plans may reference their predecessors using the Predecessor Documents Sequence (0040,A360).

Add TID xx11 as shown.

TID xx11 Imaging Agent Administration Adverse Events

This template provides information on adverse events occurring to a patient as a result of administration of an imaging agent.

TID xx11
Imaging Agent Administration Adverse Events
Type : Extensible Order : Non-Significant Root : No

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (newcode701, 99SUP164, "Imaging Agent Administration Adverse Events")	1	M		

2	>	CONTAINS	CODE	EV (newcode715, 99SUP164, “Administration discontinued”)	1	U		DCID (230) “Yes-No”
3	>	CONTAINS	CODE	EV (newcode703, DCM, “Adverse Event”)	1-n	M		DCID (xx1) Imaging Agent Administration Adverse Events
4	>>	CONTAINS	CODE	EV (G-C197, SRT, “Severity”)	1	U		BCID (3716) Severity
5	>>	CONTAINS	CODE	EV (G-D709, SRT, “Relative Time”)	1	U		DCID (xx2) Time Relative To Procedure
6	>>	HAS PROPERTIES	DATETIME	EV (newcode706, 99SUP164, “Adverse Event Detection Date Time”)	1	M		
7	>>	HAS PROPERTIES	NUM	EV (newcode704, 99SUP164, “Estimated Extravasation Volume”)	1	UC	IF Row 3 is EV (D0-B0330, SRT, “Injection Site Extravasation”)	Units = EV (ml, UCUM, “ml”)
8	>>	CONTAINS	UIDREF	EV (newcode707, 99SUP164, “Referenced Imaging Agent Administration Step UID”)	1	U		
9	>>	CONTAINS	TEXT	EV (newcode708, 99SUP164, “Referenced Imaging Agent Administration Phase Identifier”)	1	UC	IFF Row 8 is present	
10	>>	CONTAINS	TEXT	EV (121106, DCM, “Comment”)	1	U		

Content Item Descriptions

Row 2	Indicates whether the administration is discontinued due to the adverse event. There is no indication of which adverse event if any contributed to the decision to discontinue the administration.
Row 3	Note that presence of this row means the injector was informed about the adverse event by the operating clinician.
Row 6	Date and time when the adverse event was noted by the observer.
Row 8	UID of the performed step (as recorded in row 2a of TID (xx08)) where the adverse event occurred.
Row 9	Identifier of the performed phase (as recorded in row 2 of TID (xx09)) where the adverse event occurred.

455 **Add TID xx19 as shown.**

TID xx19 Imaging Agent Administration Injector Events

This template describes events occurring during the administration that are detected by an automated power injector.

TID xx19
Imaging Agent Administration Injector Events
Type: Extensible Order: Non-Significant Root : No

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (newcode1001, 99SUP164, "Imaging Agent Administration Injector Events")	1	M		
2	>	CONTAINS	CODE	EV (newcode715, 99SUP164, "Administration discontinued")	1	U		DCID (230) "Yes-No"
3	>	CONTAINS	CODE	EV (newcode1002, DCM, "Imaging Agent Administration Injector Event Type")	1-n	M		DCID (xx21) "Imaging Agent Administration Injector Event Type"
4	>>	HAS PROPERTIES	DATETIME	EV (newcode1004, 99SUP164, "Injector Event Detection Date Time")	1	M		
5	>>	HAS PROPERTIES	UIDREF	EV (newcode707, 99SUP164, "Referenced Imaging Agent Administration Step UID")	1	U		
6	>>	HAS PROPERTIES	TEXT	EV (newcode708, 99SUP164, "Referenced Imaging Agent Administration Phase Identifier")	1	UC	IFF Row 5 is present	
7	>>	HAS PROPERTIES	TEXT	EV (newcode3001, 99SUP164, "Referenced Imaging Agent Index")	1	U		Shall be as defined in DTID (xx03) EV(newcode3000, 99SUP164, "Imaging Agent Index")

Commented [UT26]: Kevin's comment #3

Content Item Descriptions

Row 4	Date and time of occurrence of injector event.
Row 5	Identifier of the performed step (as recorded in row 2a of TID (xx08)) where the injector event occured.
Row 6	Identifier of the performed phase (as recorded in row 2 of TID (xx09)) where the injector event occurred.
Row 7	The imaging agent being administered when the event was detected.

Commented [UT27]: Kevins comment #1

TID xx20 Imaging Agent Administration Graph

This template describes two-dimensional graph data for a syringe or pump.

TID xx20
Imaging Agent Administration Graph
Type: Extensible Order: Non-Significant Root : No

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (newcode1001, 99SUP164, "Imaging Agent Administration Syringe Graph")	1	M		
2	>	CONTAINS	TEXT	EV (newcode3001, 99SUP164, "Referenced Imaging Agent Index")	1	M		Shall be as defined in DTID (xx03) EV(newcode3000, 99SUP164, "Imaging Agent Index")
3	>	CONTAINS	INCLUDE	DTID (3990) Two dimensional measurement graph	1	M		$MeasurementGraph = EV(newcode811, DCM, "Flow Rate vs time") $X-Concept = EV (newcode577, DCM,"Time after the start of injection") $Y-Concept = EV (122094, DCM, "Rate of administration") $X-AxisUnit = DT (ms, UCUM,"ms") $Y-AxisUnit = DT (ml/s, UCUM,"ml/s")
4	>	CONTAINS	INCLUDE	DTID (3990) Two dimensional measurement graph	1	U		$MeasurementGraph = EV(newcode812, DCM, "Pressure vs Time") $X-Concept = EV (newcode577, DCM,"Time after the start of injection") $Y-Concept = EV (R0-010AC, SRT, "Pressure") $X-AxisUnit = DT (ms, UCUM,"ms") $Y-AxisUnit = DT (kPa, UCUM,"kPa")

Commented [UT28]: Kevin's comment #3

Commented [UT29]: Kevin's comment #2

Content Item Descriptions

Row 2	Identifies the imaging agent represented in the graph.

Commented [UT30]: Kevin's comment #2

Update the following context group with additional codes in Part16 Annex B.

CID 9300 Procedure Discontinuation Reasons

Context ID 9300
Procedure Discontinuation Reasons
Type: Extensible Version: 201xxxxx

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	110526	Resource pre-empted
DCM	110527	Resource inadequate
DCM	110528	Discontinued Procedure Step rescheduled
DCM	110529	Discontinued Procedure Step rescheduling recommended
Include CID 9301 "Modality PPS Discontinuation Reasons"		
Include CID 9302 "Media Import PPS Discontinuation Reasons"		
Include CID xx1 "Imaging Agent Administration Adverse Events"		

Add the following new context groups to Part 16 Annex B:

CID xx1 Imaging Agent Administration Adverse Events

The contrast reactions were obtained from ACR Manual of Contrast Media

Context ID xx1
Imaging Agent Administration Adverse Events
Type: Extensible Version: 201xxxxx

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	F-0499A	Drug induced Nausea and vomiting
SRT	F-5005E	Taste and sense altered
SRT	F-400A9	Sweating
SRT	F-24100	Cough
SRT	F-A21A7	Itching
SRT	D0-71000	Drug Rash
SRT	F-03CCF	Feels Warm
SRT	F-037AB	Pallor (Pale Complexion)
SRT	F-24442	Nasal Congestion
SRT	F-A2700	Headache
SRT	D0-3002F	Drug induced Flushing

SRT	F-017C0	Facial Swelling
SRT	DF-1147C	Drug Induced Dizziness
SRT	F-03261	Chills and fever
SRT	F-0B320	Anxiety
SRT	F-A4600	Shaking
SRT	D3-31121	Tachycardia-bradycardia
SRT	F-20250	Bronchospasm
SRT	D3-02000	Hypertension
SRT	D2-04460	Laryngeal edema
SRT	D0-2202B	Diffuse inflammatory erythema
SRT	D3-04006	Drug-induced hypotension
SRT	F-201B3	Dyspnea
SRT	D2-04460	Laryngeal edema (severe or rapidly progressing)
SRT	DA-30000	Epileptic convulsions
SRT	D3-04000	Hypotension
SRT	F-100EC	No motor response to command
SRT	R-FAE6C	Arrhythmias
SRT	D2-60262	Cardiopulmonary arrest
SRT	D0-B0330	Injection Site Extravasation
DCM	110515	Patient condition prevented continuing
Include CID 10043 "Intravenous Extravasation Symptoms"		

CID xx2 Time Relative To Procedure

Context ID xx2
Time Relative To Procedure
Type: Extensible Version: 201xxxxx

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	R-422A4	After Procedure
SRT	R-40FBA	During Procedure
SRT	R-40FB9	Before Procedure

CID xx4 Imaging Agent Administration Phase Type

Context ID xx4

Imaging Agent Administration Phase Type

Type: Extensible Version: 201xxxxx

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	newcode061	Automatic Administration Phase
DCM	newcode062	Automatic Programmed Hold Phase
DCM	newcode063	Automatic with Manual Hold Phase
DCM	newcode064	Automatic with Manual Inject Phase

CID xx8 Imaging Agent Administration Mode

Context ID xx8

Imaging Agent Administration Mode

Type: Extensible Version: 201xxxxx

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	newcode081	Automated Administration
DCM	newcode082	Manual Administration by Clinician
DCM	newcode083	Self Administration by Patient

CID xx9 Imaging Agent Administration Patient State

Context ID xx9

Imaging Agent Administration Patient State

Type: Extensible Version: 201xxxxx

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	F-70102	Abnormal Renal Function
DCM	113560	Acute unilateral renal blockage
DCM	113561	Low Thyroid Uptake
DCM	113562	High Thyroid Uptake
DCM	113563	Severely Jaundiced
SRT	R-102B6	History of renal failure
SRT	G-023F	History of diabetes mellitus
SRT	D2-00036	Asthma (disorder)

SRT	D3-29021	Aortic stenosis
SRT	D3-13012	Angina pectoris
SRT	G-026D	History of congestive heart failure
SRT	G-0269	History of Hypertension
SRT	D3-40300	Pulmonary hypertension
SRT	D3-20000	Cardiomyopathy
SRT	F-0B320	Anxiety
SRT	M-97651	Paraproteinemia
SRT	M-97323	Myeloma
SRT	P0-099F5	History of Beta-blocking agents therapy
SRT	DF-00BEA	Carcinoma of the thyroid
DCM	110503	Patient allergic to media/contrast

CID xx12 Pre-Medication for Imaging Agent Administration

The following list of pre-medication agents was obtained from the ACR Manual of Contrast Media.

Context ID xx12
Pre-Medication for Imaging Agent Administration
Type: Extensible Version: 201xxxxx

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)	Trade Name (Informative)
SRT	C-37138	Prednisone	
SRT	C-51450	Diphenhydramine	Benadryl
SRT	C-37128	Methylprednisolone	
SRT	C-A01D1	Methylprednisolone sodium succinate	Solu-Medrol
SRT	C-A0173	Hydrocortisone sodium succinate	Solu-Cortef
SRT	C-913A4	Dexamethasone sodium sulfate	Decadron
SRT	C-51071	H-1 Antihistamine	
SRT	C-68050	Ephedrine	
SRT	R-F2989	Papaverine	
SRT	387423006	Propofol	
SRT	373476007	Midazolam	
SRT	49998007	Sufentanil	
SRT	386839004	Remifentanil	
SRT	387560008	Alfentanil	

CID xx17 Imaging Agent Administration Completion Status

Context ID xx17
Imaging Agent Administration Completion Status
Type: Extensible Version: 201xxxxx

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	R-404F1	Complete
DCM	newcode007	Terminated due to pressure above termination limit
DCM	newcode008	Terminated due to flow rate above termination limit
DCM	newcode085	Terminated due to air detected
DCM	newcode009	Terminated due to excessive duration pause
DCM	newcode005	Terminated due to request from operator
DCM	newcode010	Terminated due to injector communication loss
DCM	newcode011	Terminated due to unspecified injector failure
DCM	newcode086	Terminated by scanner
DCM	newcode087	Terminated due to critical battery level
DCM	newcode088	Terminated due to consumable removal

CID xx18 Imaging Agent Administration Pharmaceutical Container

Commented [UT31]: New introduced CID in order to fix Kevin's comment #5. Separate to properties of CID xx19 into consumables (needed for administration/injection) and pharmaceutical containers of the agents to be delivered.

Context ID xx18
Imaging Agent Administration Pharmaceutical Container
Type: Extensible Version: 201xxxxx

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
NCIt	C43202	Prefilled Syringe
NCIt	C43183	Cartridge
SRT	R-FCBB8	Parenteral/enteral solution bag
SRT	A-27500	Bottle

Commented [UT32]: New code needed UT,SB

CID xx19 Imaging Agent Administration Consumables

Context ID xx19
Imaging Agent Administration Consumables
Type: Extensible Version: 201xxxxx

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
NCIt	C43202	Empty Syringe

Commented [UT33]: New code needed UT,SB

SRT	A-26800	Catheter
SRT	R-FDF5C	Contrast medium injection system manifold kit
SRT	A-26400	Tube, device (physical object)

Commented [UT34]: Not needed anymore due to separation of TID xx05 and TID xx06

CID xx20 Flush

Context ID xx20
Flush
Type: Extensible Version: 201xxxxx

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	C-A7220	Dextran
SRT	C-70841	Saline
SRT	C-70434	Lactated Ringer's

CID xx21 Imaging Agent Administration Injector Event Type

Context ID xx21
Imaging Agent Administration Injector Event Type
Type: Extensible Version: 201xxxxx

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	newcode001	Pressure above warning limit
DCM	newcode002	Pressure above adjustment limit
DCM	newcode003	Flow rate above warning limit
DCM	newcode004	Flow rate above adjustment limit
DCM	newcode012	Keep vein open started
DCM	newcode013	Keep vein open ended
DCM	newcode084	Air detected
DCM	newcode006	Fixed duration pause ended
DCM	newcode014	Syringe attached
DCM	newcode015	Syringe detached
DCM	110501	Equipment failure
DCM	110527	Resource inadequate

DCM	newcode007	Terminated due to pressure above termination limit
DCM	newcode008	Terminated due to flow rate above termination limit
DCM	newcode085	Terminated due to air detected
DCM	newcode009	Terminated due to excessive duration pause
DCM	newcode005	Terminated due to request from operator
DCM	newcode010	Terminated due to injector communication loss
DCM	newcode011	Terminated due to unspecified injector failure
DCM	newcode086	Terminated by scanner
DCM	newcode087	Terminated due to critical battery level
DCM	newcode088	Terminated due to consumable removal

CID xx23 Imaging Agent Administration Step Type

Context ID xx23
Imaging Agent Administration Step Type
Type: Extensible Version: 201xxxxx

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	newcode1116	Patency Test Injection
DCM	newcode1117	Transit Time Test Injection
DCM	newcode1118	Diagnostic Administration
DCM	newcode1120	Flush Administration

Modify PS 3.16 CID 3850 to change name at the request of David to suit the way it is being used in the Intravascular OCT image IOD.

CID 3850 ~~Intravascular OCT Flush Agent~~ Contrast Bolus Substance

Type: Extensible

Version: 201xxxxx

Table CID 3850. ~~Intravascular OCT Flush Agent~~ Contrast Bolus Substance

Add the following new context groups

CID xx24 Bolus Shaping Curves

Context ID xx24
Bolus Shaping Curves
Type: Extensible Version: 201xxxxx

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	newcode2401	Negative exponential
DCM	newcode2402	Linear Curve

CID xx25 Imaging Agent Administration Consumable Catheter Type

Context ID xx25
Imaging Agent Administration Consumable Catheter Type
Type: Extensible Version: 201xxxxx

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	A-26836	Peripheral intravenous catheter
SRT	A-26810	Central venous catheter
SRT	A-1450B	Implantable venous access port
SRT	A-26810	Peripherally inserted central catheter
SRT	R-FEAEC	Rectal Catheter

CID xx26 Low-High Only

Context ID xx26
Low-High Only
Type: Non-Extensible Version: 201xxxxx

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)	SNOMED-CT Concept ID
SRT	G-A374	Low	62482003
SRT	G-A373	High	75540009

Commented [UT35]: Snomed says High is OK

Add to PS 3.16 Annex D

Annex D DICOM Controlled Terminology Definitions (Normative)

Commented [UT36]: Kevin's comments #6 down below

This Annex specifies the meanings of codes defined in DICOM, either explicitly or by reference to another part of DICOM or an external reference document or standard.

DICOM Code Definitions (Coding Scheme Designator "DCM" Coding Scheme Version "01")

Code Value	Code Meaning	Definition	Notes
newcode001	Pressure above warning limit	The injector device detected a pressure above the warning threshold, generated a warning and did not automatically terminate the administration.	
newcode002	Pressure above adjustment limit	The injector device detected a pressure above the adjustment limit, took compensating action and did not automatically terminate the administration.	
newcode003	Flow rate above warning limit	The injector device detected a flow rate above the warning threshold, generated a warning and did not automatically terminate the administration.	
newcode004	Flow rate above adjustment limit	The injector device detected a flow rate above the adjustment limit, took compensating action and did not automatically terminate the administration.	
newcode005	Terminated due to request from operator	The injector device terminated the administration due to detection of an abort request by the operator.	
newcode006	Fixed duration pause ended	The device detected that a pause duration has been reached and the device resumed automatically.	
newcode007	Terminated due to pressure above termination limit	The injector device detected a pressure above the termination limit and automatically terminated the administration.	

newcode008	Terminated due to flow rate above termination limit	The injector device detected a flow rate above the termination limit and automatically terminated the administration.	
newcode009	Terminated due to excessive duration pause	The Injector device detected that a pause duration has exceeded limit and the injector device terminated the administration.	
newcode010	Terminated due to injector communication loss	The injector device detected a communication loss and automatically terminated the administration.	
newcode011	Terminated due to unspecified injector failure	The injector device detected an unspecified failure and automatically terminated the administration.	
newcode012	Keep vein open started	The injector device started saline flow for the purpose of keeping vein open.	
newcode013	Keep vein open ended	The injector device ended saline flow for the purpose of keeping vein open.	
newcode014	Syringe attached	The injector device detected that a syringe was attached to the injector.	
newcode015	Syringe detached	The injector device detected that a syringe was detached from the injector.	
newcode016	Total Keep Vein Open Volume Administered	Total volume of flush delivered by the keep vein open function of the injector.	
newcode051	Pre-filled Container	A container that is prefilled with a substance to be administered.	
newcode052	Empty Container	A container that is empty.	
newcode061	Automatic Administration Phase	An administration phase where fluid is being delivered by an injector system according to the programmed instructions.	
newcode062	Automatic Programmed Hold Phase	An administration phase where fluid delivery is stopped by the injector system until a programmed time elapses.	
newcode063	Automatic with Manual Hold Phase	An administration phase where the fluid is delivered automatically by an injector system and stopped under manual control by the operator.	
newcode064	Automatic with Manual Inject Phase	An administration phase where the fluid is delivered by the injector system under manual control by the operator. E.g., Cardiac Cath.	
newcode081	Automated Administration	An administration mode where the fluid is delivered automatically by an injector system.	
newcode082	Manual Administration by Clinician	An administration mode where the substance is delivered manually by a clinician. E.g., Clinician manual injection of an imaging agent.	

newcode083	Self Administration by Patient	An administration mode where the substance is delivered by a patient self administration. E.g., Swallowing an imaging agent.	
newcode084	Air detected	The injector device detected air in the tubing or syringe before or during the imaging agent administration and did not automatically terminate the administration.	
newcode085	Terminated due to air detected	The injector device detected air in the tubing or syringe and terminated the administration.	
newcode086	Terminated by scanner	The injector device received instruction from scanner to terminate the administration and terminated the administration.	
newcode087	Terminated due to critical battery level	The injector device detected critical battery level and terminated the administration.	
newcode088	Terminated due to consumable removal	The injector device detected removal of a consumable from the injector device and terminated the administration.	
newcode089	Flush	Inactive fluid used to clear an administration path of an active agent.	
newcode500	Administration Mode	A code that specifies how the imaging agent is administered to the patient.	
newcode511	Planned Imaging Agent Administration Procedure Report	A report of the planned patient-specific imaging agent administration steps.	
newcode541	Imaging Agent Information	Description of a specific imaging agent that was planned or was administered.	
newcode550	Osmolality at 37C	Number of osmoles of solute per kilogram of solvent at 37C.	
newcode551	Osmolarity at 37C	Number of osmoles of solute per liter (L) at 37C.	
newcode552	Viscosity at 37C	A measure of a resistance of a fluid to gradual deformation by stress, measured at 37C.	
newcode553	Imaging Agent Warmed	Indicates if an imaging agent was warmed prior to the administration procedure.	
newcode554	Contrast Transverse Relaxivity	The degree to which a paramagnetic contrast agent can enhance the proton transverse relaxation rate constant (R2, 1/T2), normalized to the concentration of the contrast agent.	

Commented [UT37]: Holistic #48 Papaverine is listed in DCID xx12

Commented [UT38]: Holistic #49: says that this code is not used.. Right! Replaced by newcode807. Suggested to be removed.

Commented [UT39]: Hologic coment #7

Sridhar please verify correctness.

		Also referred to as r2. Typically expressed in units l/mmol/s.	
newcode571	Imaging Agent Administration Steps	Information about list of administration steps for administering imaging agent.	
newcode573	Pressure Limit	A limit set at the power injector device indicating the maximum allowed pressure planned for administering the imaging agent.	
newcode574	Performed Pressure Maximum	The maximum pressure observed while administering the imaging agent.	
newcode577	Time after the start of injection	Time after the start of injection of a delivered imaging agent administration.	
newcode581	Imaging Agent Administration Step	An administration step in an imaging agent administration Steps. ?An administration step in an imaging agent administration ?Steps.?Plan? An administration step in list of imaging agent administration.	
newcode582	Imaging Agent Administration Step Identifier	Identifies a step in an imaging agent administration plan.	
newcode583	Imaging Agent Administration Delay	Time difference between the nominal start of the administration step and the actual start of imaging agent administration. Clarify whether this is a planned/intentional delay or whether this is defined vs performed	
newcode584	Scan Delay	Time difference between the start of imaging agent administration and the start of image acquisition.	
newcode585			
newcode591	Imaging Agent Administration Phase	Information about a delivery phase of an imaging agent administration step.	
newcode592	Imaging Agent Administration Phase Identifier	Identifies a phase in an imaging agent administration step.	
newcode593	Imaging Agent Administration Phase	Type of phase in an imaging agent	

Commented [UT40]: Holistic #50

Commented [UT41]: Holistic #51

Commented [UT42]: Holistic #52

Commented [UT43]: Our opinion UT,SB

Commented [UT44]: To be discussed in WG-06

Commented [UT45]: Relies on Hologic comment #11 and it's solution

	Type	administration step.	
newcode595	Initial Volume of Imaging Agent in Container	The volume of the imaging agent in an imaging agent container before administration.	
newcode596	Residual Volume of Imaging Agent in Container	The volume of the imaging agent remaining in the imaging agent container after administration.	
newcode597	Rise Time	Time for the pressure of the injection to build up from zero to the set pressure.	
newcode598	Starting Flow Rate of administration	Flow rate at the start of an administration of the imaging agent.	
newcode599	Ending Flow Rate of administration	Flow rate at the end of an administration of the imaging agent.	
newcode6000	Bolus Shaping Curve	A vendor-specific code indicating the shape of the flow rate curve within an administration phase.	
newcode603	Imaging Agent Administration Completion Status	The status of the imaging agent administration procedure at completion as reported by the automated injector or by the administering person.	
newcode701	Imaging Agent Administration Adverse Events	Information about adverse events occurring during administration of an imaging agent.	
newcode703	Adverse Event	An adverse event occurring in a patient.	
newcode704	Estimated Extravasation Volume	The estimated volume lost at the injection site. The estimation includes extravasation, paravenous administration and leakage at the injection site.	
newcode706	Adverse Event Detection Date Time	Date and Time when an adverse event was noticed by the observer.	
newcode707	Referenced Imaging Agent Administration Step UID	The unique identifier of the imaging agent administration step being referenced.	
newcode708	Referenced Imaging Agent Administration Phase Identifier	The identifier an imaging agent administration phase being referenced.	
newcode712	Programmable Device	Indicates if a device can be programmed.	
newcode713	Number of Injector Heads	Number of injector heads or pumps (Single or dual or many) in an injector device.	

Commented [UT46]: Hologic #54

Commented [UT47]: Hologic #55 & 56

Commented [UT48]: Hologic #55 & 56

Commented [UT49]: Holistic-Keyes: Not used any more due to introduction of TIDxx04 Syringe/Pump

newcode715	Administration discontinued	Whether the imaging agent administration was discontinued.	
newcode800	Imaging Agent Container Volume	Volume of the container used for administering the imaging agent. Volume of the container holding the imaging agent (during administration?)Answer: No	
newcode801	Imaging Agent Administration Consumable	Information about the imaging agent accessory or consumable used for performing the imaging agent administration.	
newcode802	Imaging Agent Administration Consumable Type	Type of consumable used for performing the imaging agent administration.	
newcode803	Imaging Agent Administration Pharmaceutical Packaging Type	Type of packaging of pharmaceutical used for performing procedure.	
newcode805	Imaging Agent Administration Container Fill Type	The initial fill state of an imaging agent container.	
newcode807	Planned Imaging Agent Administration	Information about the imaging agent administration steps that is patient-specific.	
newcode809	Performed Imaging Agent Administration	Information about the imaging agent administration steps that were delivered to a patient.	
newcode810	Contrast Volume Limit	The maximum volume of contrast agent allowed to be administered.	
newcode811	Flow Rate vs Time	Graph depicting the measurement of flow rate of fluid against time.	
newcode812	Pressure vs Time	Graph depicting the measurement of pressure of fluid against time.	
newcode813	Barcode Number	The alphanumeric string from reading a barcode.	
newcode1001	Imaging Agent Administration Injector Events	Information about events that occurred at an injector during an imaging agent administration.	
newcode1002	Imaging Agent Administration Injector Event Type	Type of event that occurred at an injector during an imaging agent administration.	
newcode1004	Injector Event Detection Date Time	Date and time when an injector event was detected.	
newcode1010	Planned Imaging Agent Administration SOP Instance	Reference to a Planned Imaging Agent Administration SOP instance.	

Commented [UT50]: New UT, SB

Commented [UT51]: Our suggestion

~~newcodexxx~~	~~UDI~~	~~FDA Unique device identification code of the consumable used for imaging agent administration.~~	
newcode1100	Imaging Agent Administration Syringe/Pump Phase Activity	Information about the activity of one of the pump or syringe units used in an imaging agent administration phase.	
newcode1102	Imaging Agent Component	Information about a component of an imaging agent.	
newcode1103	Component Volume	Volume of one imaging agent component in a mixture of multiple components.	
newcode1104	Total Phase Volume Administered	Total volume administered by all syringes/pump actions during a single phase.	
newcode1105	Total Step Volume Administered	Total volume administered by all syringes/pump actions within all phases during a single Step.	
newcode1106	Total number of manually triggered injections	Total number of times that an injection was triggered manually.	
newcode1107	Is Interventional Study	Indicates if the imaging study is for an interventional procedure.	
newcode1110	Peak Flow Rate in Phase Activity	Peak flow rate value detected at a specific location (syringe or pump) during a specific activity of an administration phase.	
newcode1111	Peak flow rate in Phase	Peak flow rate value detected at any location (syringe or pump) during a single administration phase.	
newcode1113	Peak Pressure in Phase	Peak pressure value detected at any location (syringe or pump) during a single administration phase.	
newcode1114	Imaging Agent Administration Step UID	Unique identification of a single imaging agent administration step.	
newcode1116	Patency Test Injection	An injection of an inactive agent to test for blockages or leakages in the delivery path, usually performed prior to an administration of an imaging or therapeutic agent.	
newcode1117	Transit Time Test Injection	An injection of a bolus of imaging agent to determine the appropriate delay time for a diagnostic administration.	
newcode1118	Diagnostic Administration	Administration of an imaging agent for the purpose of enhancing contrast in	

Commented [SRB52]: Do not add code in this supplement.
CP-1686 will assign this code.

		an image.	
newcode1119	Administration Step Type	Type of step in an imaging agent administration. For example, a test administration or a diagnostic administration.	
newcode1120	Flush Administration	Injection of an inactive fluid to clear the administration path of an active agent.	
newcode2401	Negative exponential	A curve that decays exponentially from a specified start value, at a specified decay rate.	
newcode2402	Linear Curve	A curve that changes linearly from a specified start value to a specified end value. Note: The start value and the end value may be the same, indicating a flat curve.	
newcode3000	Imaging Agent Index	Identifies an imaging agent uniquely within a set of imaging agents. The imaging agent may be a single component or a mix of multiple components.	
newcode3001	Referenced Imaging Agent Index	The index of an imaging agent being referenced.	
newcode4000	Consumable Index	Identifies a consumable uniquely within a list of consumables.	
newcode4001	Referenced Consumable Index	The index of a consumable being referenced.	
newcode5000	Consumable Catheter Type	Type of catheter used for imaging agent administration.	
newcode6000	Imaging Agent Component Usage	How an imaging agent component is used.	
newcode6006	Type of Agent Given	Type of pharmaceutical agent used for Imaging Agent Administration. The agent may be a contrast or any other pharmaceutical agent administered along with the contrast. For example a stress agent.	

Commented [UT53]: New UT, SB

Changes to NEMA Standards Publication PS 3.17

Digital Imaging and Communications in Medicine (DICOM)

Part 17: Explanatory Information

Add new Section to Annex XX of PS 3.17:

Annex XX Imaging Agent Administration Report Template (Informative)

XX.1 PURPOSE OF THIS ANNEX

This Annex describes the use of the contrast agent administration reporting. The contrast agent administration report object records the planned and performed delivery of contrast agents.

A planned imaging agent administration object is intended for representing the plan or program to deliver contrast agent to the patient for a contrast study. It could be programmed prior to the time of schedule of a study. Often, it is programmed and customized for a patient by the radiologist. The plan may be altered by the operating technologist user prior to the study or by the delivery system during the study as a result of events that may occur during the delivery of imaging agent such as flow rate limiting due to high pressure, injection abortion due to adverse events etc.

A performed imaging agent administration report object is for reporting the actual plan or program that was used to deliver the contrast agent during a medical imaging study.

The scope is intended to cover all modalities in which radiographic agents are introduced into the body in a controlled fashion (CT, MR, XA).

Figure xx-1 below illustrates various consumers of the performed imaging agent administration SR object (referred as “Contrast SR” in figure below) post administration. Upon administration of imaging agent, the infusion manager prepares the performed SR object by obtaining the injection related data from the injection system, including data from the point-of-care bar code scanner on the consumables and accessories (e.g., disposables like Syringe, Catheters used) and then sending it to the acquisition modality, RIS, reporting system and image archive.

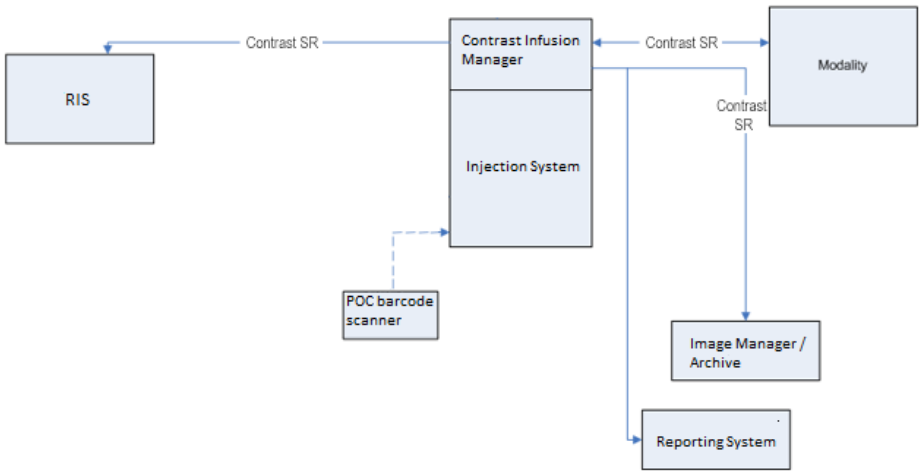

Contrast SR
Contrast Infusion Manager
Contrast SR
Modality
RIS
Contrast SR
Injection System
POC barcode scanner
Image Manager / Archive
Reporting System

Figure xx-1

Following are some of the use cases that use the above objects for imaging agent administration reporting.

Use Case 1 – Manual Bolus Injection with input from DSS/Order Filler/Modality

This use-case gives an example of how a performed object could be used. The technologist performs a manual administration of contrast for a contrast examination. The operator selects the patient from the infusion manager (available through modality worklist) and reports the minimum parameters about the injection. The infusion manager then generates a performed Imaging administration SR object and sends to the RIS.

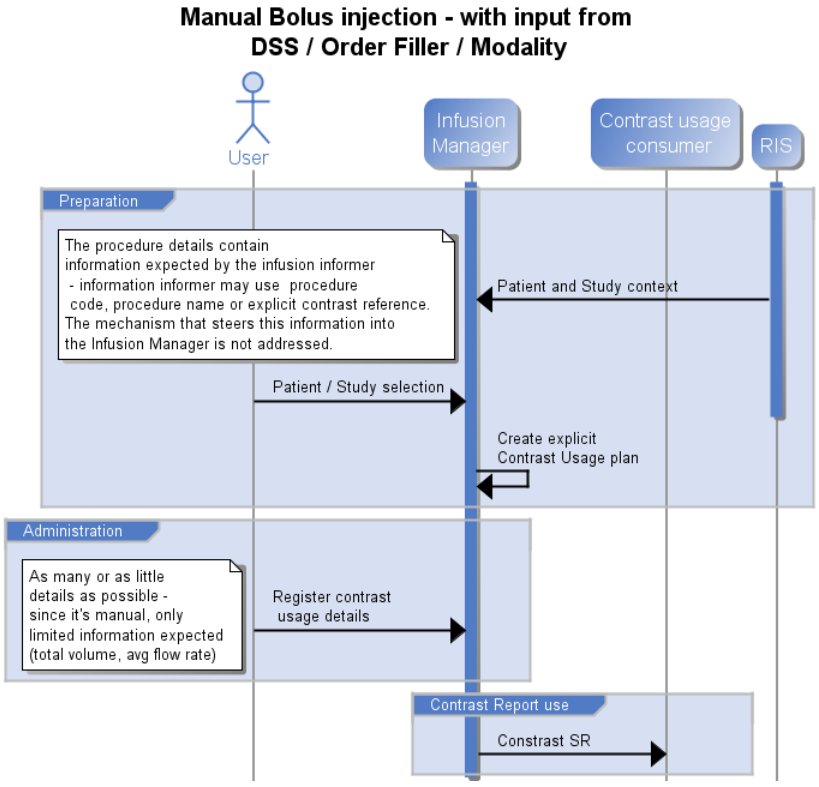


Figure xx-2

Use Case 2 – Automatic Infusion Pump – Contrast Reporting

The technologist selects a patient at the infusion manager through work list available from the scheduling system and then performs an automated administration of contrast for the selected patient. The infusion manager records various events during the administration. The data from the injector events and from the adverse events that occurred during the administration are captured and obtained by the infusion manager.

Upon completion of the administration procedure, the infusion manager generates a performed imaging administration SR object using the injection data obtained from the injection system including various events and updated parameters that was captured during the administration. The generated report is then sent to the Scheduling system or RIS and other contrast usage consumers like reporting systems or image archive.

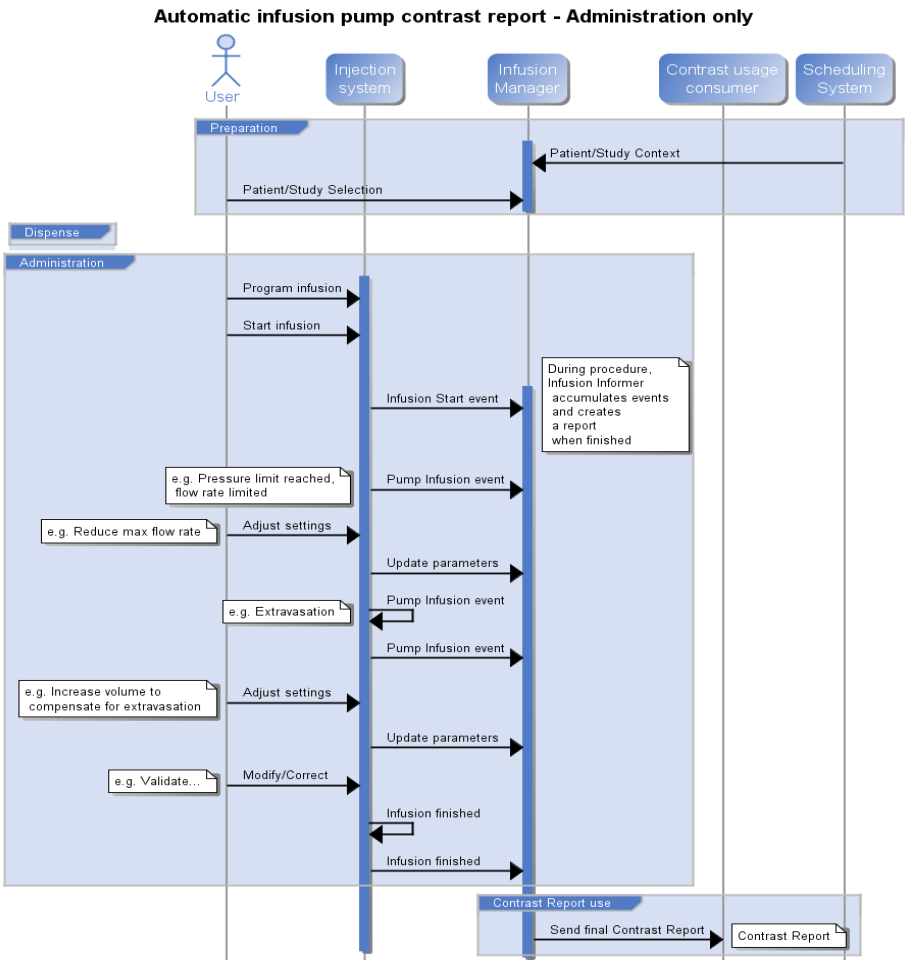


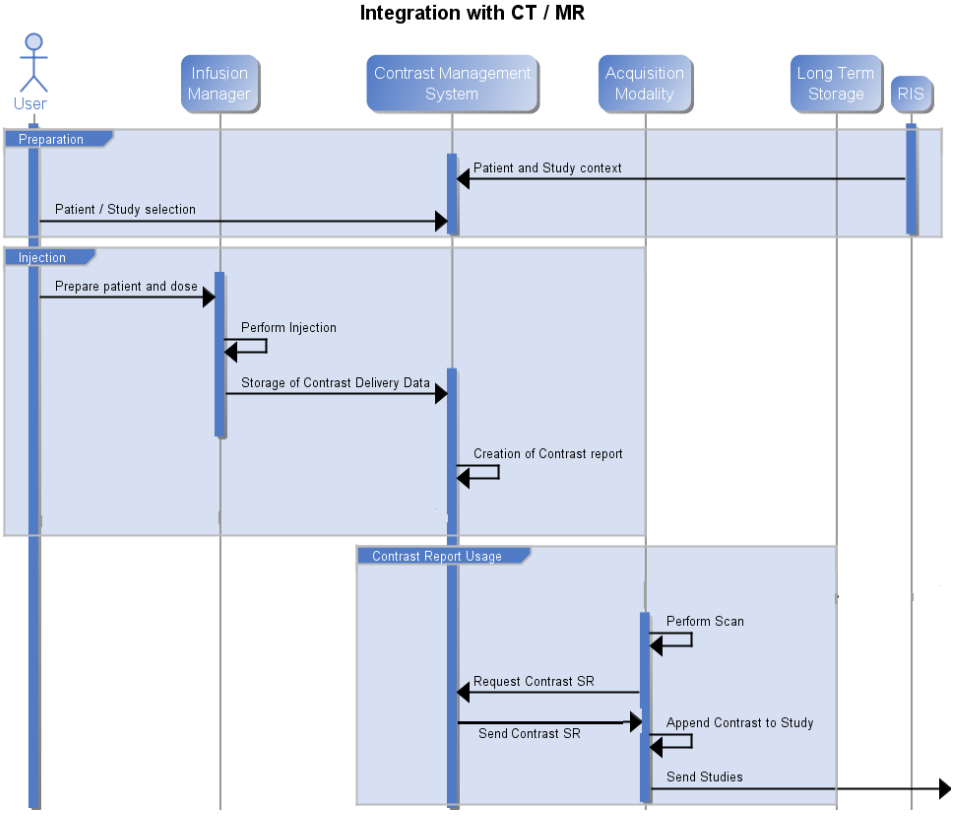
Figure xx-3

670

675 **Use Case 3 – Integration with CT / MR**

The following diagram illustrates the integration with CT / MR acquisition modalities.

The contrast management system obtains the patient and study context from the work list scheduler or RIS enabling the end-user to select the patient. The injection administration is performed and the contrast management system creates the injection report as a performed imaging agent administration SR object
680 as soon as the administration is complete. The acquisition modality requests the contrast management system for the contrast SR, which is then sent over to the acquisition modality. The contrast report usage is parsed by the acquisition modality and the contrast parameters are added to the study. The updated study contains injection related data which is then sent over to the archive.



685 Figure xx-4

Use Case 4 – Protocoling

This use-case gives an example on how a planned object could be used. The radiologist uses the protocoling client in order to plan the contrast administration protocols specific to a patient. The protocoling client outputs the planned object into the infusion manager which is used by the technologist for contrast administration.

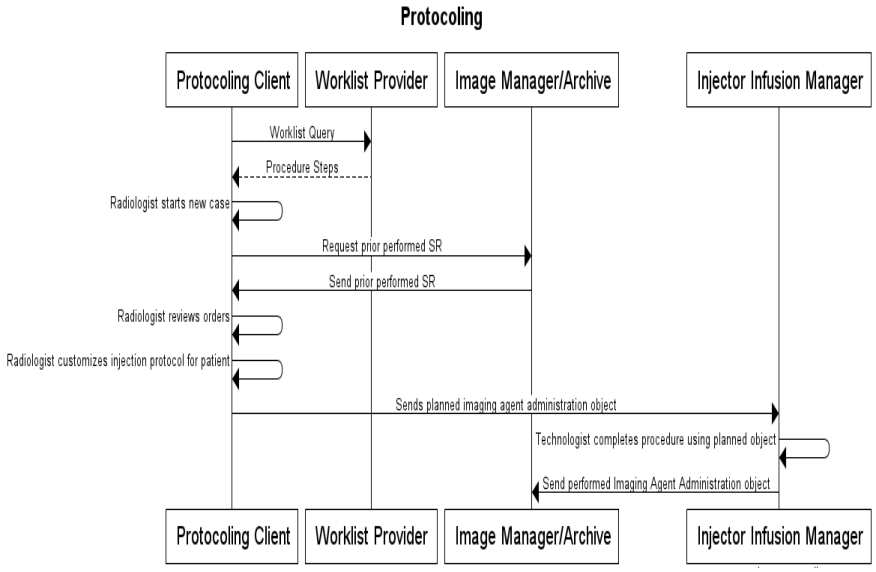
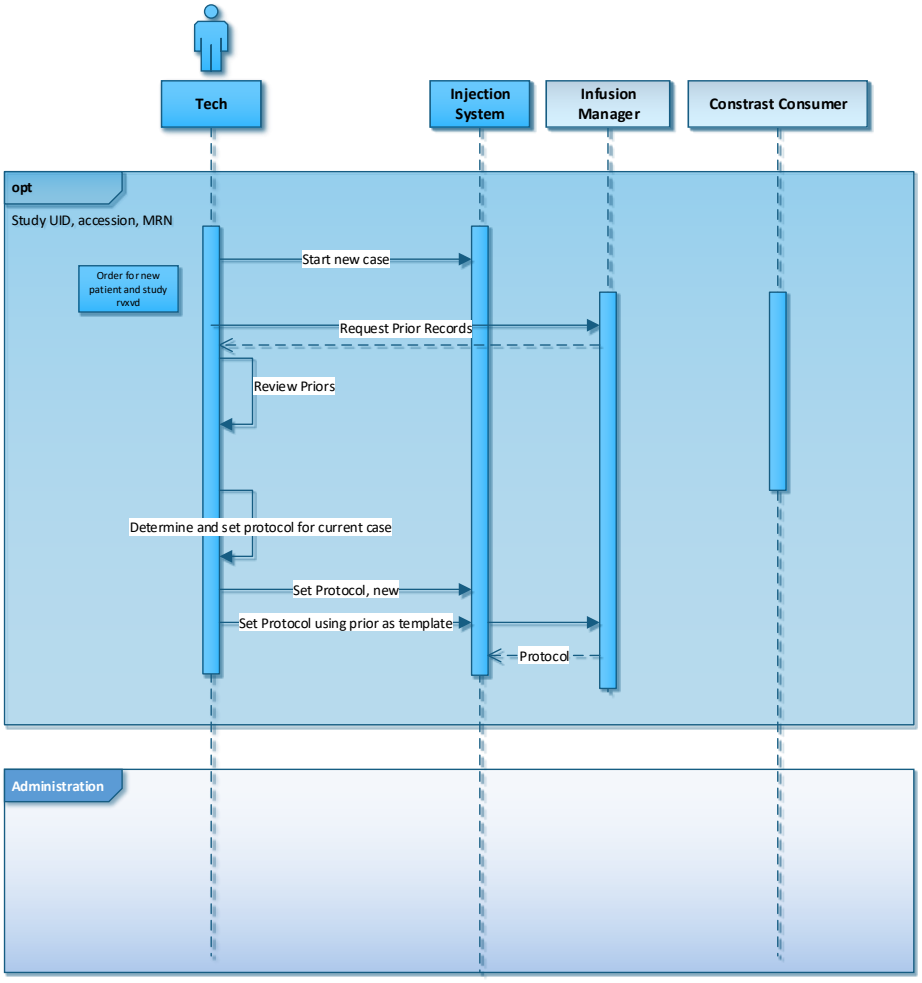


Fig xx-5

Use Case 4A – Technologist/Injection System Protocoling Review and Recall



705

Fig xx-6

Paramount in the protocoling workflows are access to previous records of contrast administration. In certain instances when, for instance, the injection did not complete correctly there is utility in reviewing the waveform objects presenting the pressure and flow rates over time. There is also value in checking prior catheter and consumable data.

In the technologist review and protocoling use case, a clinically valuable usage is the ability to “make current” in the injection system a protocol (contrast fluid steps) used on a prior visit or one that is explicitly prescribed by a radiologist. The mechanics and actors involved in that workflow step are out of scope for the current consideration, but imperative to the design of the contrast administration record is a consistent structure, vocabulary and ontology making possible the automatic population of a contrast protocol for the current case.

Use Case 5 – Consumption of the Contrast Information by Reporting Systems for automated documentation

The most straightforward and ubiquitous need for the contrast administration record is in the radiologist reporting workflow. Inclusion of delivered contrast data into templates or sections of the report is mandated in some regions of the world as evidence for billing reconciliation. More generally, the radiologist can include these data for completeness of examination documentation. Ostensibly, contrast data included in reports may be used to construct a longitudinal record of contrast exposure for patients undergoing multiple imaging examinations.

In the reporting use-case, the actors may be configured such that the infusion manager can push a contrast administration record to the reporting system upon completion of the contrast enhanced study or the reporting system may query the infusion manager for a patient's contrast administration record during the steps necessary to prepare a study for radiologist review and authoring of the case. In either case (push or query), the contrast administration record data model must be sufficient to enable reconciliation with the rest of the data in the record. Data of primary importance in this workflow are the summary values of contrast delivered to the patient (total volume of contrast, saline, flow rate and concentration/type of contrast used). Often, information describing the vascular access device used (eg: catheter gauge) is clinically relevant and/or mandated. Furthermore, the notation of any adverse event of incident should be reported (eg: patient reactions, infiltration, pressure limiting).

The following is an excerpt from the **American College of Radiology's Practice Guideline for Communication of Diagnostic Imaging Finding**s (2010 version) addressing the procedural elements that should be included in a diagnostic imaging report:

(Page 2, section II.A.3.a)

a. Procedures and materials

The report should include a description of the studies and/or procedures performed and any contrast media and/or radiopharmaceuticals (including specific administered activities, concentration, volume, and route of administration when applicable), medications, catheters, or devices used, if not recorded elsewhere. Any known significant patient reaction or complication should be recorded.

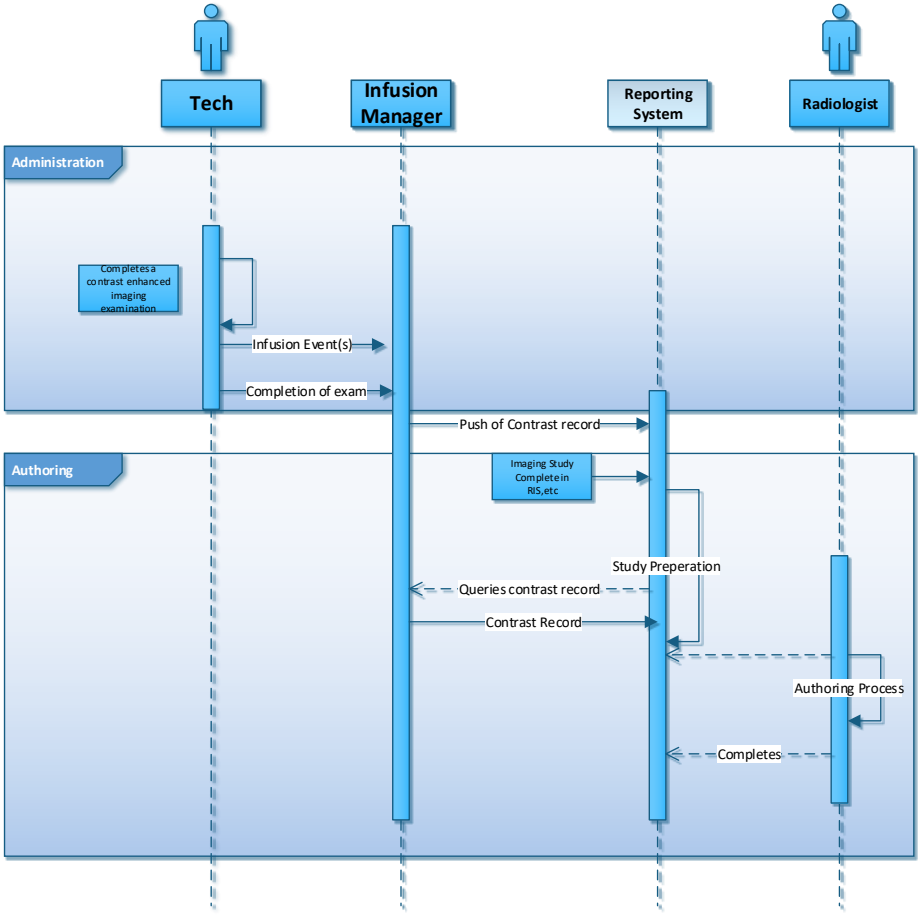

Tech
Infusion Manager
Reporting System
Radiologist
Administration
Completes a contrast enhanced imaging examination
Infusion Event(s)
Completion of exam
Push of Contrast record
Authoring
Imaging Study Complete in RIS,etc
Study Preperation
Queries contrast record
Contrast Record
Authoring Process
Completes

Fig xx-7

Use Case 5a – General post-processing Consumption

Reporting systems are not the only information system or interested consumers of the contrast administration record. Other systems that may persist or use the contrast administration information are: RIS, PACS, CVIS, and EHR systems. In each instance, these systems may receive the contrast administration record or query it from an infusion manager or other contrast management system actor.

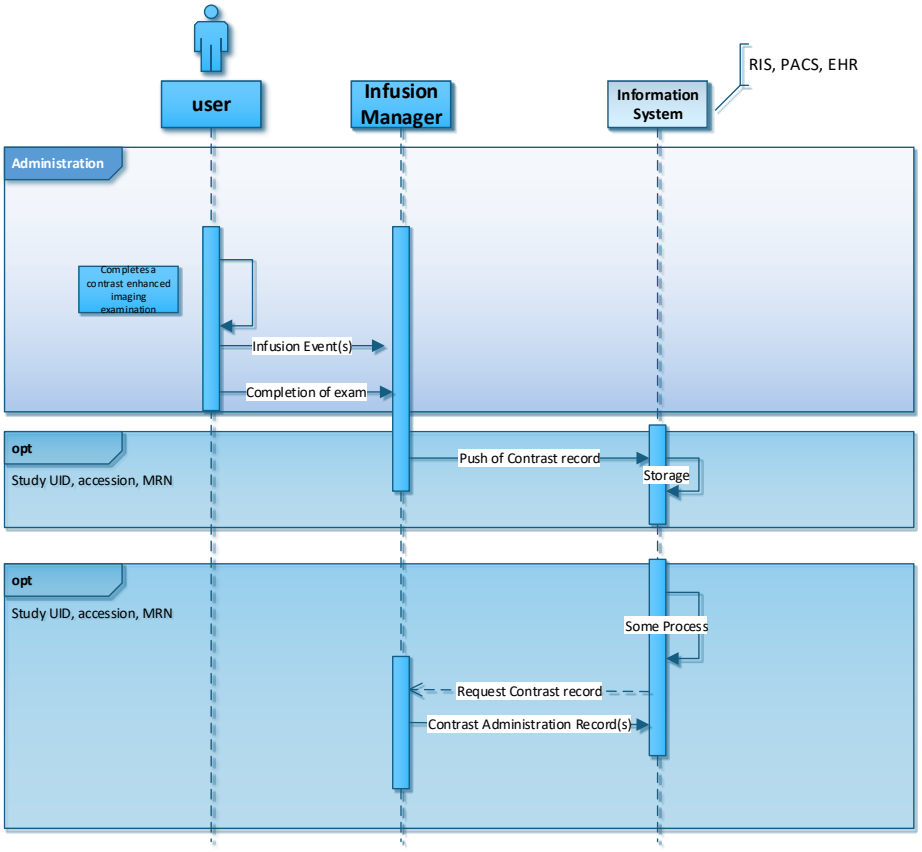


Fig xx-8

Other consideration – reporting/consumption

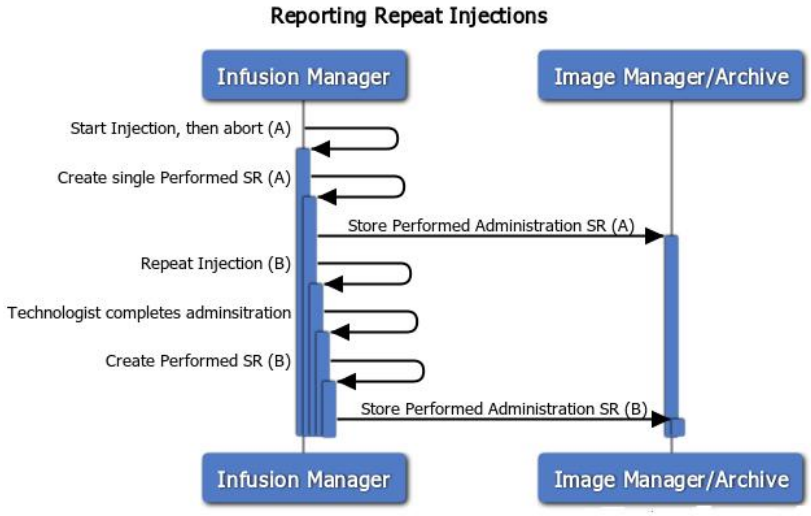
There is tremendous utility for administrative and operational personnel to review the contrast administration records. These users may be imaging department management, pharmacy staff, QA teams, or directors. Some of the uses of the contrast SR records are the ability to query and collect administration records and compute analytics on total contrast used and consumables used. Furthermore, the ability to track and compile adverse event rates and understand protocol adherence are important considerations. The generic workflow for any of these users are similar to Case 4 and 4A.

Use Case 6 – Consumption of the Contrast Information upon multiple injections scenario

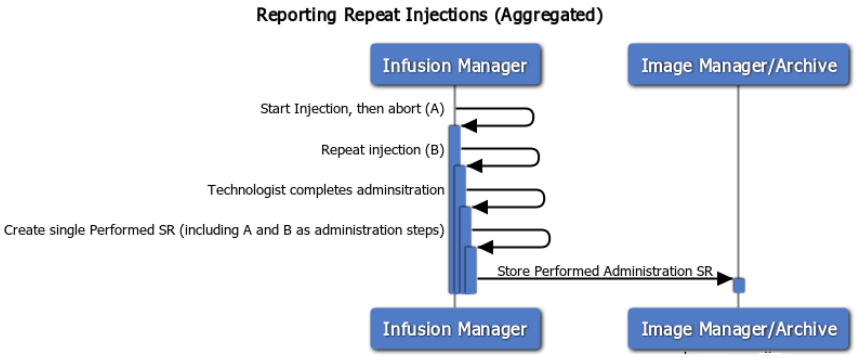
Upon a situation where the contrast delivery has to be repeated, for example, if the technologist had to abort the injection administration due to patient complaining of pain and then redo the administration, this may be considered a repeat. The consumers may receive one or more Performed Imaging Agent Administration SR instances for the study, one for each administration depending on the design of the infusion managers. For instance, for the above example scenario, maximum of two performed SR objects may be received, reporting on each of the performed injection.

Alternatively, it is also possible for an infusion manager to aggregate the performed administrations for the same study into one single Performed Imaging Agent Administration SR instance, containing multiple imaging agent administration step describing each injection. For instance, for the above example each injection shall be an administration step totaling to two steps under one single Performed SR instance.

1


Reporting Repeat Injections
Infusion Manager
Image Manager/Archive
Start Injection, then abort (A)
Create single Performed SR (A)
Store Performed Administration SR (A)
Repeat Injection (B)
Technologist completes adminsitration
Create Performed SR (B)
Store Performed Administration SR (B)
Infusion Manager
Image Manager/Archive

830


Reporting Repeat Injections (Aggregated)
Infusion Manager
Image Manager/Archive
Start Injection, then abort (A)
Repeat injection (B)
Technologist completes adminsitration
Create single Performed SR (including A and B as administration steps)
Store Performed Administration SR
Infusion Manager
Image Manager/Archive