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**Digital Imaging and Communications in Medicine (DICOM)**

*Supplement 164: Contrast Agent Administration Reporting*

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

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### Table of Contents

	Table of Contents .....	2
30	Scope and Field of Application .....	4
	CLOSED ISSUES .....	4
	Changes to NEMA Standards Publication PS 3.2 .....	11
	Changes to NEMA Standards Publication PS 3.3 .....	12
	A.35.X3 Planned Imaging Agent Administration SR Information Object Definition .....	12
35	A.35.X3.1 Planned Imaging Agent Administration SR Information Object Description .....	12
	A.35.X3.2 Planned Imaging Agent Administration SR IOD Entity-Relationship Model .....	12
	A.35.X3.3 Planned Imaging Agent Administration SR IOD Module Table .....	12
	A.35.X3.3.1 Planned Imaging Agent Administration SR IOD Content Constraints	12
40	A.35.X4 Performed Imaging Agent Administration SR Information Object Definition .....	14
	A.35.X4.1 Performed Imaging Agent Administration SR Information Object	
	Description .....	14
	A.35.X4.2 Performed Imaging Agent Administration SR IOD Entity-Relationship	
	Model .....	14
45	A.35.X4.3 Performed Imaging Agent Administration SR IOD Module Table .....	14
	A.35.X4.3.1 Performed Imaging Agent Administration SR IOD Content Constraints	14
	Changes to NEMA Standards Publication PS 3.4 .....	16
	B.5 STANDARD SOP CLASSES .....	16
50	Changes to NEMA Standards Publication PS 3.6 .....	17
	Changes to NEMA Standards Publication PS 3.16 .....	18
	PLANNED IMAGING AGENT ADMINISTRATION SR IOD TEMPLATES .....	18
	TID xx01 Planned Imaging Agent Administration .....	19
	TID xx03 Imaging Agent Information .....	24
55	TID xx04 Imaging Agent Administration Syringe/Pump Phase Activity .....	25
	TID xx05 Imaging Agent Component .....	27
	TID xx06 Imaging Agent Administration Consumable .....	29
	TID xx07 Imaging Agent Administration Steps .....	30
	TID xx08 Imaging Agent Administration Step .....	31
60	TID xx09 Imaging Agent Administration Phase .....	33
	PERFORMED IMAGING AGENT ADMINISTRATION SR IOD TEMPLATES .....	34
	TID xx10 Performed Imaging Agent Administration .....	34
	TID xx11 Imaging Agent Administration Adverse Events .....	37
	TID xx19 Imaging Agent Administration Injector Events .....	38
65	TID xx20 Imaging Agent Administration Graph .....	39
	CID 9300 Procedure Discontinuation Reasons .....	41
	CID xx1 Imaging Agent Administration Adverse Events .....	41
	CID xx2 Time Relative To Procedure .....	42
	CID xx4 Imaging Agent Administration Phase Type .....	43
70	CID xx8 Imaging Agent Administration Mode .....	43
	CID xx9 Imaging Agent Administration Patient State .....	43
	CID xx12 Pre-Medication for Imaging Agent Administration .....	44
	CID xx13 Medication for Imaging Agent Administration .....	45
	CID xx17 Imaging Agent Administration Completion Status .....	45
75	CID xx18 Imaging Agent Administration Pharmaceutical Unit of Presentation .....	45
	CID xx19 Imaging Agent Administration Consumables .....	46

80

CID xx20	Flush.....	46
CID xx21	Imaging Agent Administration Injector Event Type.....	47
CID xx23	Imaging Agent Administration Step Type.....	48
CID 3850	<del>Intravascular OCT Flush Agent</del> Contrast Bolus Substance.....	48
CID xx24	Bolus Shaping Curves.....	48
CID xx25	Imaging Agent Administration Consumable Catheter Type.....	49
CID xx26	Low-High .....	49
CID xx30	Medication Type Code Type for Pre-Medication.....	50
85	Annex D DICOM Controlled Terminology Definitions (Normative).....	50
	Changes to NEMA Standards Publication PS 3.17 .....	59
	Annex XX Imaging Agent Administration Report Template (Informative) .....	59
	Annex YYY Performed Imaging Agent Administration Structured Report (Informative) .....	65

90

### 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).

95 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.

- 100 • 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.
- 105 • 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.

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

### CLOSED ISSUES

1	<p><b>Q:</b> 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.</p> <p><b>A:</b> 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.</p> <p>This issue is closed.</p>
2	<p><b>Q.</b> 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?</p> <p><b>A:</b> Contrast Agent Admin SR has been eliminated. In case of such a need to refer “performed” instance, use explicit UID reference.</p> <p>This issue is Closed.</p>

3	<p><b>Q:</b> 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?</p> <p><b>A:</b> Yes, there will be new value for all objects.</p>
4	<p><b>Q:</b> 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?</p> <p><b>A:</b> Generate new UID for “Frame of Reference UID”. This issue is Closed.</p>
5	<p><b>Q:</b> 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?</p> <p><b>A:</b> Either put an explicit UID reference in performed object or directly look up based on the Study UID. This issue is closed.</p>
6	<p><b>Q:</b> What is the use of Contrast Agent Administration SR? Can we instead use Key-Objection-Selection SR document for this purpose?</p> <p><b>A:</b> 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.</p>
7	<p><b>Q:</b> 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).</p> <p><b>A:</b> Adding a new Contrast/Bolus Agent IE. Closed.</p>
8	<p>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.</p> <p><b>A:</b> Yes. Aggregated reporting is not considered. Closed</p>
9	<p>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?</p> <p><b>A:</b> Yes, we could flag Completed / Terminated / User Aborted, however cannot say successful.</p>

10	<p>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?</p> <p>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?</p> <p><b>A:</b> Question is Out of scope.</p>
11	<p><b>Q:</b> Imaging Agent Admin. Plan – Separate instance or just template?</p> <p><b>A:</b> 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.</p>
12	<p><b>Q:</b> Should we create performed object if the agent was never administered but only attempted?</p> <p><b>A:</b> 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.</p>
13	<p><b>Q:</b> Work on Adverse Event Grade under adverse event template.</p> <p><b>A:</b> Not a WG-06 question.</p>
14	<p><b>Q:</b> Should 7.4.2 Synchronization module be optional under Planned/Performed Imaging Agent Admin. IODs?</p> <p><b>A:</b> It is mandatory in performed object, not required to add in planned object.</p>
15	<p><b>Q:</b> Design of Defined SR IOD – Add Defined Subst. Admin. IE?</p> <p>How does it affect ‘Contrast Agent IE’ under Basic-Performed Object change then? Should we change it to ‘Subst. Admin. IE’?</p> <p><b>A:</b> Use ‘Imaging Agent Admin. IE’ in both defined and Basic sop modules.</p> <p>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</p> <p>Defined object is out of scope. Closed.</p>
16	<p><b>Q:</b> 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?</p> <p>If the answer is yes for the above question, how does one obtain the Event UID string?</p> <p><b>A:</b> Closed. Irrelevant, since it has been agreed to remove radiopharmaceuticals.</p>
17	<p><b>Q:</b> 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</p> <p>What data from supplement 159 related to radio-pharma administration needs inclusion?</p> <p><b>A:</b> Closed. Irrelevant, since it has been agreed to remove radiopharmaceuticals.</p>

18	<p><b>Q:</b> Consider renaming Contrast Agent Administration Reporting to Imaging Agent Administration Report?</p> <p><b>A:</b> 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?</p>
19	<p><b>Q:</b> 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)?</p> <p><b>A:</b> Closed. Nothing could be done about it. Cannot be addressed in DICOM.</p>
20	<p><b>Q:</b> 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?)</p> <p><b>A:</b> Closed. Its Dexamethasone sodium sulfate – confirmed from ACR Manual of Contrast Media.</p>
21	<p><b>Q:</b> In Context table CID xx18 (Consumable type), do we add radiopharma explicitly?</p> <p><b>A:</b> Closed. No. It has been agreed to remove radiopharmaceuticals.</p>
22	<p><b>Q:</b> 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</p> <p><b>A:</b> Closed. As Basic Performed object has been agreed to be removed.</p>
23	<p><b>Q:</b> 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)</p> <p><b>A:</b> Closed. Irrelevant, since it has been agreed to remove radiopharmaceuticals.</p>
24	<p><b>Q:</b> Is “DCID (xx13) GFR Measurements”, a comprehensive representation appropriate to convey GFR measurement and methods?</p> <p><b>A:</b> Closed. See CP-1589.</p>
25	<p><b>Q:</b> 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?</p> <p><b>A:</b> Closed. Author for planned object is the one who plans it, which is already being captured.</p>
26	<p><b>Q:</b> 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?</p> <p><b>A:</b> Closed. When new agents are invented, we'll add them to the CID.</p>
27	<p><b>Q:</b> 126203 Radiopharmaceutcial Incubation time concept is removed from Defined / Planned template.</p> <p><b>A:</b> Closed. Irrelevant since it has been agreed to remove radiopharmaceuticals.</p>

28	<p><b>Q.</b> The concept EV (newcode512, 99SUP164, Rationale for Administering Imaging Agent) under Planned Imaging Agent Administration TID xx01:</p> <p>a. Is there an advantage in adding this concept? Should we get rid of this?</p> <p>b. Should this also be coded and what codes should be used?</p> <p>c. How does this relate to AAPM protocol “diagnostic task” (e.g., “Identify pulmonary embolus”, etc.)</p> <p><b>A:</b> Concept not necessary, removed it. Closed.</p>
29	<p><b>Q:</b> 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?</p> <p><b>A:</b> Above concept and TID in question no longer proposed as a consequence of re-using TID 10024 instead.</p>
30	<p><b>Q: Should this supplement address Radiopharmaceutical?</b></p> <p><b>A:</b> 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.</p>
31	<p>Is UPC Code is the correct code to identify a consumable related to Imaging Agent administration?</p> <p>Added UDI. Closed.</p>
32	<p>Is the concept “Use of intra-arterial injection papaverine” limited to intra-arterial?</p> <p>No feedback received. Closed.</p>
33	<p>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?</p> <p><b>A:</b> 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.</p>
34	<p>Under TID xx05, Imaging Agent Information table, do we need concept EV (newcode546, 99SUP164, “Imaging Agent Order Date”)?</p> <p>This refers to when the physician ordered it. No, not trying to capture original order date. Closed.</p>
35	<p>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”)?</p> <p>No feedback received. Closed.</p>



36	<p>Does "DTID (1005) Procedure Context" template required in the root templates? Is the context about the procedure covered in the header sufficient?</p> <p>Yes, it' needed. No, the header is insufficient. Closed.</p>
37	<p>Do we need to report the risk factors in the performed and planned instance?</p> <p>A: Risk factors are already being covered under the proposed modification of TID 10024 Patient characteristics. Closed.</p>
38	<p>The Concept, EV(newcode806, 99SUP164, "Imaging Agent Consumable Product Code") Should it be generic product code? How does this related to the UDI?</p> <p>A: Concept no longer proposed. Using UDI. Closed.</p>
39	<p>See TID xx05 Imaging Agent Information: Should we constrain the units for Concentration?</p> <p>No. Closed.</p>
40	<p>Does any modality have a strong need for the Basic object?</p> <p>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.</p> <p>Early drafts of the supplement included a Basic object with limited summary details in attributes rather than SR.</p> <p>Keeping a Basic object would duplicate information and require support of additional SOP classes.</p> <p>No longer relevant. Closed.</p>
41	<p>Are these concept codes under CID xx19 "Imaging Agent Administration Consumable Container Type ", too generic? Or should we make a new code?</p> <ul style="list-style-type: none"> <li>- SRT code A-27500 for "Bottle"</li> <li>- SRT code R-FDEB9 for "Syringe"</li> <li>- NCIt code R-FEEFF for "Cartridge"</li> </ul> <p>No feedback received. Closed.</p>
42	<p>Is a waveform appropriate for programmed plan? Will the automatic injection system want a waveform?</p> <p>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.</p> <p>Out of Scope. Closed.</p>

43	<p>Is the following acceptable?</p> <p>This report is unable to report an adverse event separately from a completed administration report.</p> <p>If the adverse events were detected during the administration, it is captured in the administration report.</p> <p>Some adverse events are detected after the completion of administration report, therefore there is no DICOM object to report those events.</p> <p>Yes, there are separate adverse event tracking systems that are not expected to use DICOM. Closed.</p>
44	<p>What is the best way to handle non-patient specific plans (e.g., Clinical trial plan)?</p> <p>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.</p> <p>Should they be part of the device protocol (like CT Protocols)? Should they be separate?</p> <p>Out of Scope. Closed.</p>
45	<p>Do we want to permit other equivalent codes instead of DICOM codes under TID xx05 Rows 2 and 3?</p> <p>No, a mapping to the codes from barcode or user entry is needed anyway, so might as well have one stable target set. Closed.</p>
46	<p>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 ?</p> <p>Or should it be described as an accessory and separately the agent describes as an agent volume.</p> <p>The latter is chosen. Closed.</p>
47	<p>Do we need to add CID xx1 "Imaging Agent Administration Adverse Events" into CID 9300 "Procedure discontinuation reasons"?</p> <p>Yes. Closed.</p>
48.	<p>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?</p> <p>A: We will use "Consumables" until we find a better name for it.</p>

**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**

120

**Table A.1-2  
UID VALUES**

UID Value	UID NAME	Category
...		
<u>1.2.840.10008.5.1.4.1.1.88.xx3</u>	<u>Planned Imaging Agent Administration SR Storage SOP Class</u>	Transfer
<u>1.2.840.10008.5.1.4.1.1.88.xx4</u>	<u>Performed Imaging Agent Administration SR Storage SOP Class</u>	Transfer
...		

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## Changes to NEMA Standards Publication PS 3.3

### Part 3: Information Object Definitions

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*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.

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**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**

145

**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**

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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):

- 155 TEXT
- CODE
- NUM
- DATETIME
- DATE
- 160 TIME
- UIDREF
- PNAME
  
- 165 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 <sup>1</sup>
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.

175

**A.35.X4 Performed Imaging Agent Administration SR Information Object Definition**180 **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**

185 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

190 **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**

195 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):

200 TEXT  
CODE  
NUM  
DATETIME  
DATE  
TIME  
UIDREF

205 PNAME  
 COMPOSITE  
 IMAGE  
 WAVEFORM  
 CONTAINER

210 **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.

215 **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 <sup>1</sup> , IMAGE <sup>1</sup> , WAVEFORM <sup>1</sup> , CONTAINER.
TEXT, CODE, NUM, CONTAINER	HAS OBS CONTEXT	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME, COMPOSITE <sup>1</sup>
CONTAINER, IMAGE <sup>1</sup> , WAVEFORM <sup>1</sup> , COMPOSITE <sup>1</sup> , NUM	HAS ACQ CONTEXT	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME, CONTAINER.
any type	HAS CONCEPT MOD	TEXT, CODE <sup>2</sup>
TEXT, CODE, NUM	HAS PROPERTIES	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME, IMAGE <sup>1</sup> , WAVEFORM <sup>1</sup> , COMPOSITE <sup>1</sup> , 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 <sup>1</sup> , WAVEFORM <sup>1</sup> , COMPOSITE <sup>1</sup> , 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.

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**Changes to NEMA Standards Publication PS 3.4**

**Digital Imaging and Communications in Medicine (DICOM)**

**Part 4: Service Class Specifications**

230 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.

235

**Table B.5-1  
STANDARD SOP CLASSES**

SOP Class Name	SOP Class UID	IOD Specification (defined in PS 3.3)
...	...	...
<u>Planned Imaging Agent Administration SR Storage</u>	<u>1.2.840.10008.5.1.4.1.1.88.xx3</u>	<u>Planned Imaging Agent Administration SR IOD</u>
<u>Performed Imaging Agent Administration SR Storage</u>	<u>1.2.840.10008.5.1.4.1.1.88.xx4</u>	<u>Performed Imaging Agent Administration SR IOD</u>
...	...	...

...



240

**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:*

...	...	...	...
<b><u>1.2.840.10008.5.1.4.1.1.88.xx3</u></b>	<b><u>Planned Imaging Agent Administration SR Storage</u></b>	<b><u>SOP Class</u></b>	<b><u>PS 3.4</u></b>
<b><u>1.2.840.10008.5.1.4.1.1.88.xx4</u></b>	<b><u>Performed Imaging Agent Administration SR Storage</u></b>	<b><u>SOP Class</u></b>	<b><u>PS 3.4</u></b>
...	...	...	...

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255

## Changes to NEMA Standards Publication PS 3.16

### Digital Imaging and Communications in Medicine (DICOM)

#### Part 16: Content Mapping Resource

260

**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](https://en.wikipedia.org/wiki/Imaging_agent)".]

265

- 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**

270

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

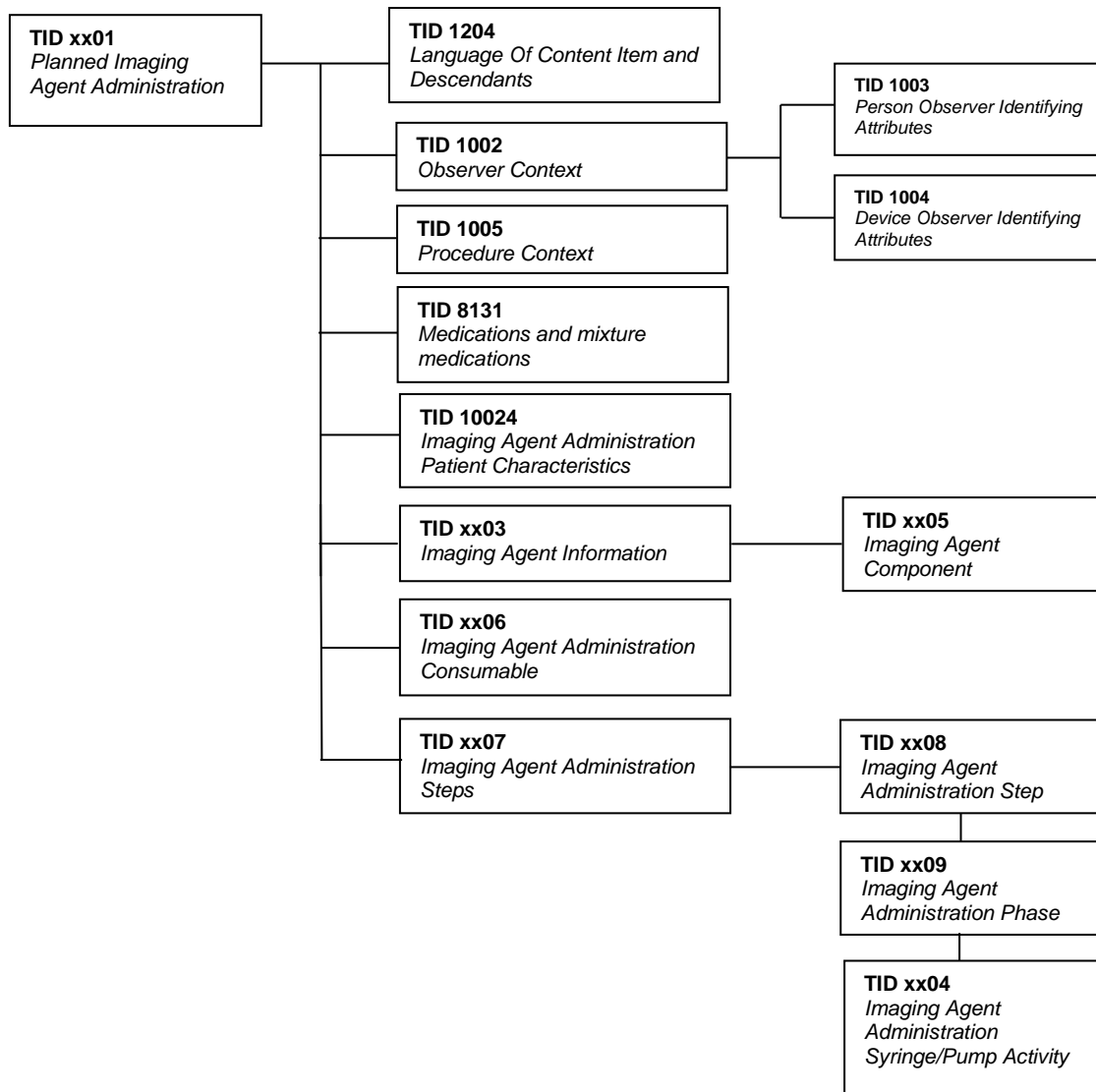


Figure A.x-1: Planned Imaging Agent Administration SR IOD Template Structure

275

**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.

280

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		

285

**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.

290

295

**Modify TID 8131 as shown**

**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., pre-medication drugs for a imaging procedure on humans or anesthesia for imaging of research small animals)

300

**Table TID 8131. Parameters**

<u>Parameter Name</u>	<u>Parameter Usage</u>
<u>\$DrugAdministered</u>	<u>Type of drug administered</u>

**Type: Extensible**

**Order: Significant**

305

**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	<u>\$DrugAdministered</u> <b>DCID-623</b> <b>"Medication for</b>

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
								<b>Small Animal Anesthesia</b>
7	>>	CONTAINS	TEXT	EV (122083, DCM, "Drug administered")	1	MC	XOR Row 6	
8	>>	CONTAINS	CODE	EV (111516, DCM, "Medication Type")	1	M		DCID 621 "Medication Type Code Type for Small Animal Anesthesia"  <b><u>DCID xx30</u></b> <b><u>"Medication Type Code Type for Pre-Medication"</u></b>
<u>11</u>	<u>&gt;&gt;</u>	<u>CONTAINS</u>	<u>CODE</u>	<u>EV (113510, DCM, "Drug Product Identifier")</u>	<u>1</u>	<u>U</u>		
<u>12</u>	<u>&gt;&gt;&gt;</u>	<u>HAS PROPERTIES</u>	<u>TEXT</u>	<u>EV (111529, DCM, "Brand Name")</u>	<u>1</u>	<u>U</u>		
<u>13</u>	<u>&gt;&gt;</u>	<u>CONTAINS</u>	<u>NUM</u>	<u>DCID (3410) Numeric Parameters of Drugs/Contrast</u>	<u>1-n</u>	<u>U</u>		

**Content Item Descriptions**

310

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 <u>CID 11 "Route of Administration"</u> 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.
<b>Row 11</b>	<b><u>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.</u></b>

**TID 8130 Anesthesia**

Type: Extensible

Order: Non-Significant

315

**Table TID 8130. Anesthesia**

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (P1-0512A, SRT, "Administration of anesthesia")	1	M		
...								
17	>>	CONTAINS	INCLUDE	DTID 8131 "Medications and Mixture Medications"	1-n	M		<b><u>\$DrugAdministered = DCID 623 "Medication for Small Animal Anesthesia"</u></b>

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

320

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

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

325

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

330

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"  <u>DCID (xx9) "Imaging Agent Administration Patient State"</u>
3	>	CONTAINS	NUM	EV (121033, DCM, "Subject Age")	1	U		UNITS = DCID 7456 "Units of Measure for Age"
...								

335 **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.

**TID xx03  
Imaging Agent Information**

340

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 Identifier")	1	M		
3	>	CONTAINS	CODE	EV(newcode553, 99SUP164, "Imaging Agent Warmed")	1	M		DCID 230 "Yes-No"
4	>	CONTAINS	CONTAINER	EV(newcode557, 99SUP164, "Imaging Agent Component Usage")	1-n	M		
5	>>	CONTAINS	INCLUDE	DTID (xx05) Imaging Agent Component	1	M		
6	>>	CONTAINS	NUM	EV (newcode1103, 99SUP164, "Component Volume")	1	MC	IF 2 or more items of row 4 are present	UNITS = EV (ml, UCUM, "ml")



7	>	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")
---	---	----------	-----	--	---	----	--	---------------------------

**Content Item Descriptions**

Row 2	Uniquely, within the scope of the root container, identifies the imaging agent contained in a syringe or pump.
Row 4	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 6	Estimated volume of the imaging agent component.

**Add TID xx04 as shown.**

345 **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.

**TID xx04**

**Imaging Agent Administration Syringe/Pump Phase Activity**

**Type : Extensible      Order : Non-Significant      Root : No**

350

	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 Identifier")	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	MC	IF TID (xx08) Row 4 = 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")
10	>	CONTAINS	NUM	EV (newcode1113, 99SUP164, "Peak Pressure in Phase Activity")	1	MC	IF TID (xx08) Row 4 = EV (newcode081, DCM, "Automated Administration")  AND  IFF root Concept Name Code Sequence = (newcode809, 99SUP164, "Performed Imaging Agent Administration")	UNITS = EV (kPa, UCUM, "kPa")
11	>	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")
12	>	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")
13	>	CONTAINS	DATETIME	EV (111526, DCM, "DateTime Started")	1	MC	IFF root Concept Name Code Sequence = (newcode809, 99SUP164, "Performed Imaging Agent Administration")	
14	>	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 10	Peak value of the pressure of this syringe or pump activity.
Row 13	Datetime this individual syringe or pump activity actually started.
Row 14	Duration of this individual syringe or pump activity.

**Add TID xx05 as shown.**

355 **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

360

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (newcode1102, 99SUP164, "Imaging Agent Component")	1	M		
2	>	CONTAINS	CODE	EV (122083, DCM, "Drug administered")	1	M		DCID (12) Radiographic Contrast Agent OR DCID (3204) Stress Agents OR DCID (xx20) Flush OR DCID (xx13) Medication for Imaging Agent Administration
3	>	CONTAINS	CODE	EV (G-C52F, SRT, "Active Ingredient")	1	U		DCID (13) Radiographic Contrast Agent Ingredient
4	>	CONTAINS	CODE	EV (113510, DCM, "Drug Product Identifier")	1	U		
5	>	CONTAINS	NUM	EV (122093,"DCM", "Concentration")	1	U		
6	>	CONTAINS	NUM	EV (282258000, SRT, "Molarity")	1	U		UNITS = EV (mmol/L, UCUM, "mmol/L")
7	>	CONTAINS	CODE	EV (56953008, SRT, "Osmolality")	1	U		DCID (xx26) Low-High
8	>	CONTAINS	NUM	EV (126380, DCM, "Contrast Longitudinal Relaxivity")	1	U		UNITS = EV(L/mmol/s, UCUM, "L/mmol/s")
9	>	CONTAINS	NUM	EV (newcode554, 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		
13	>	CONTAINS	CODE	EV(newcode555, 99SUP164, "Is Ionic")	1	U		DCID (231) "Yes-No Only"
14	>	CONTAINS	NUM	EV(newcode556, 99SU164, "Dosing Factor")	1	U		
15	>	CONTAINS	CODE	EV (732935002, SCT, "Unit of Presentation")	1	M		DCID (xx18) Imaging Agent Administration Pharmaceutical Unit of Presentation
16	>	CONTAINS	NUM	EV (newcode800, DCM, "Imaging Agent Volume Per Unit of Presentation")	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, NCI, "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		
22	>	CONTAINS	TEXT	EV (newcode813, 99SUP164, "Barcode Number")	1-n	UC	IFF root Concept Name Code Sequence = (newcode807, 99SUP164, "Planned Imaging Agent Administration")	
23	>	CONTAINS	TEXT	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 medication agents.
Row 5	Concentration of the active ingredient (Row 3). The units are not constrained but shall be represented as usual using UCUM.

Row 7	Osmolality relative to blood.
Row 8	Relaxivity at 37C at B0 field strength.
Row 9	Relaxivity at 37C at B0 field strength.
Row 12	The units are not constrained but shall be represented as usual using UCUM.
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 number from the barcode associated with the unit of presentation e.g., the individual bottle. Some examples for type of codes are UPC, EAN, GTIN, PZN, PPN. Multiple items are permitted for planned imaging agent administration since multiple container sizes may be allowed.

**Add TID xx06 as shown.**

365 **TID xx06 Imaging Agent Administration Consumable**

This template describes a material or supply used in the course of an Imaging Agent administration procedure, other than the imaging agents themselves and the unit of presentation of the imaging agents if pre-filled. This includes such supplies as needles, tubing, cannulas, catheters, empty syringes.. This template may describe reusable or disposable materials.

370 For the planned administration, these are the expected consumables. For the performed administration, this template 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		
2	>	CONTAINS	CODE	EV (newcode802, 99SUP164, "Imaging Agent Administration Consumable Type")	1	M		DCID (xx19) Imaging Agent Administration Consumables
3	>	CONTAINS	NUM	EV (121146, DCM, "Quantity of Material")	1	U		
4	>>	CONTAINS	CODE	EV (newcode803, 99SUP164, "Is Consumable New")	1	M		DCID (230) Yes-No
5	>	CONTAINS	TEXT	EV (121147, DCM, "Billing Code")	1	U		
6	>	CONTAINS	TEXT	EV (121145, DCM, "Description of Material")	1	U		
7	>	CONTAINS	DATE	EV (C70854, NCI, "Medical Product Expiration Date")	1	U		
8	>	CONTAINS	NUM	EV (111467, DCM, "Needle Length")	1	U	IF Row 2 = EV (A-26800, SRT, "Catheter")	UNITS = EV (mm, UCUM, "mm")

9	>	CONTAINS	NUM	EV (122319, DCM, "Catheter Size")	1	MC	IF Row 2 = EV (A-26800, SRT, "Catheter")  AND  If Row 10 = EV(A-26836, SRT, "Peripheral intravenous catheter")	UNITS = DCID (3510) Catheter Size Units
10	>	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
11	>	CONTAINS	TEXT	EV (C0947322, UMLS, "Manufacturer Name")	1	U		
12	>	CONTAINS	TEXT	EV (111529, DCM, "Brand Name")	1	U		
13	>	CONTAINS	TEXT	EV (newcode813, 99SUP164, "Barcode Number")	1-n	UC	IFF root Concept Name Code Sequence = (newcode807, 99SUP164, "Planned Imaging Agent Administration")	
14	>	CONTAINS	TEXT	EV (newcode813, 99SUP164, "Barcode Number")	1	UC	IFF root Concept Name Code Sequence = (newcode809, 99SUP164, "Performed Imaging Agent Administration")	
15	>	CONTAINS	TEXT	EV (121148, DCM, "Unit Serial Identifier")	1	U		
16	>	CONTAINS	TEXT	EV (121149, DCM, "Lot Identifier")	1	U		
17	>	CONTAINS	CODE	EV (128739, DCM, "UDI")	1	U		

375

**Content Item Descriptions**

Row 3	Quantity of the imaging agent consumed or quantity of accessories or other consumables used.
Row 5	The billing codes for material used for imaging agent administration procedure. It does not include performance and interpretation of the imaging.
Row 11	Name of the manufacturer of the consumable.
Row 13,14	The number from the barcode associated with the unit of presentation e.g., the individual blister package. Some examples for type of codes are UPC, EAN, GTIN. Multiple items are permitted for planned imaging agent administration since multiple container sizes may be allowed.

**Add TID xx07 as shown.**

**TID xx07 Imaging Agent Administration Steps**

380

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.

**TID xx07**

**Imaging Agent Administration Steps**

385

**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		
2	>	CONTAINS	TEXT	EV(newcode586, 99SUP164, "Imaging Agent Administration Steps Name")	1	M		
3	>	CONTAINS	TEXT	EV (newcode585, 99SUP164, "Imaging Agent Administration Steps Description")	1	U		
4	>	CONTAINS	INCLUDE	DTID (xx08) Imaging Agent Administration Step	1-n	U		

**Add TID xx08 as shown.**

**TID xx08      Imaging Agent Administration Step**

390 This template provides detailed information on an 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**

395

**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		
3	>	CONTAINS	UIDREF	EV (newcode1114, 99SUP164, "Imaging Agent Administration Performed Step UID")	1	MC	IFF root Concept Name Code Sequence = (newcode809, 99SUP164, "Performed Imaging Agent Administration")	
4	>	CONTAINS	CODE	EV (newcode500, 99SUP164, "Administration Mode")	1	M		DCID (xx8) Imaging Agent Administration Mode

5	>	CONTAINS	CODE	EV (113874, DCM, "Person Role in Organization")		MC	IF row 4 = EV(newcode082, DCM, "Manual Administration")	DCID 7450 "Person Roles"
6	>	CONTAINS	CODE	EV (newcode1119, 99SUP164, "Administration Step Type")	1	M		DCID (xx23) Imaging Agent Administration Step Type
7	>	CONTAINS	NUM	EV (newcode583, 99SUP164, "Administration Delay")	1	U		UNITS = EV (s, UCUM, "s")
8	>	CONTAINS	NUM	EV (newcode584, 99SUP164, "Scan Delay")	1	U		UNITS = EV (s, UCUM, "s")
9	>	CONTAINS	NUM	EV (newcode573, 99SUP164, "Pressure Limit")	1	UC	IFF Row 4 = EV (newcode081, DCM, "Automated Administration")	UNITS = EV (kPa, UCUM, "kPa")
10	>	CONTAINS	CODE	EV (G-C340, SRT, "Route of Administration")	1	M		DCID (11) Route of Administration
11	>>	HAS PROPERTIES	CODE	EV(G-C581, SRT, "Site of")	1	MC	IF Row 10 equals (G-D101, SRT, "Intravenous route") Or (G-D109, SRT, "Intra-articular route")	DCID 3746 "Percutaneous Entry Site"
12	>>>	HAS CONCEPT MOD	CODE	EV(G-C171, SRT, "Laterality")	1	MC	IF Row 11 has laterality	DCID 244 Laterality
13	>	CONTAINS	INCLUDE	DTID (xx09) Imaging Agent Administration Phase	1-n	M		
14	>	CONTAINS	INCLUDE	DTID (xx20) Imaging Agent Administration Graph	1-n	UC	IFF root Concept Name Code Sequence = (newcode809, 99SUP164, "Performed Imaging Agent Administration")	
15	>	CONTAINS	NUM	EV (newcode713, 99SUP164, "Number of Injector Heads")	1	U		
16	>	CONTAINS	CODE	EV (newcode712, 99SUP164, "Programmable Device")	1	U		DCID (231) "Yes – No Only"



17	>	CONTAINS	CONTAINER	EV (newcode080, DCM, "Manually triggered injection information")	1	UC	IF Row 4 = EV (newcode081, DCM, "Automated Administration")  AND  IFF root Concept Name Code Sequence = (newcode809, 99SUP164, "Performed Imaging Agent Administration")	
18	>>	CONTAINS	NUM	EV (newcode1105, DCM, "Total Step Volume Administered")	1	M		UNITS = EV (ml, UCUM, "ml")
19	>>	CONTAINS	NUM	EV (newcode1106, DCM, "Total number of manually triggered injections")	1	M		

**Content Item Descriptions**

Row 14	For a multi- syringe/pump injector there will be one graph per syringe/pump system. This is only included in the performed administration because it is descriptive not prescriptive.
--------	---

400 **Add TID xx09 as shown.**

**TID xx09 Imaging Agent Administration Phase**

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.

405

**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	UIDREF	EV (newcode111x, 99SUP164, "Imaging Agent Administration Performed Phase UID")	1	MC	IFF root Concept Name Code Sequence = (newcode809, 99SUP164, "Performed Imaging Agent Administration")	

4	>	CONTAINS	CODE	EV (newcode593, 99SUP164, "Imaging Agent Administration Phase Type")	1	MC	IF TID (xx08) Row 4 = EV (newcode081, DCM, "Automated Administration")	DCID (xx4) Imaging Agent Administration Phase Type
5	>	CONTAINS	INCLUDE	DTID (xx04) Imaging Agent Administration Syringe/Pump Phase Activity	1-n	MC	IF TID (xx08) Row 4 = EV (newcode081, DCM, "Automated Administration"))	
6	>	CONTAINS	NUM	EV (newcode1104, DCM, "Total Phase Volume Administered")	1	M		UNITS = EV (ml, UCUM, "ml")
7	>	CONTAINS	DATETIME	EV (111526, DCM, "DateTime Started")	1	MC	IFF root Concept Name Code Sequence = (newcode809, 99SUP164, "Performed Imaging Agent Administration")	
8	>	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 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 5	There will be one item for each syringe / pump activity that is administering an agent during this phase.
Row 7	Datetime that the earliest syringe/pump starts administering.
Row 8	Total duration of this phase starting from where the earliest syringe/pump starts administering until the last syringe/pump ends administering.

410

**PERFORMED IMAGING AGENT ADMINISTRATION SR IOD TEMPLATES**

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

**TID xx10 Performed Imaging Agent Administration**

415

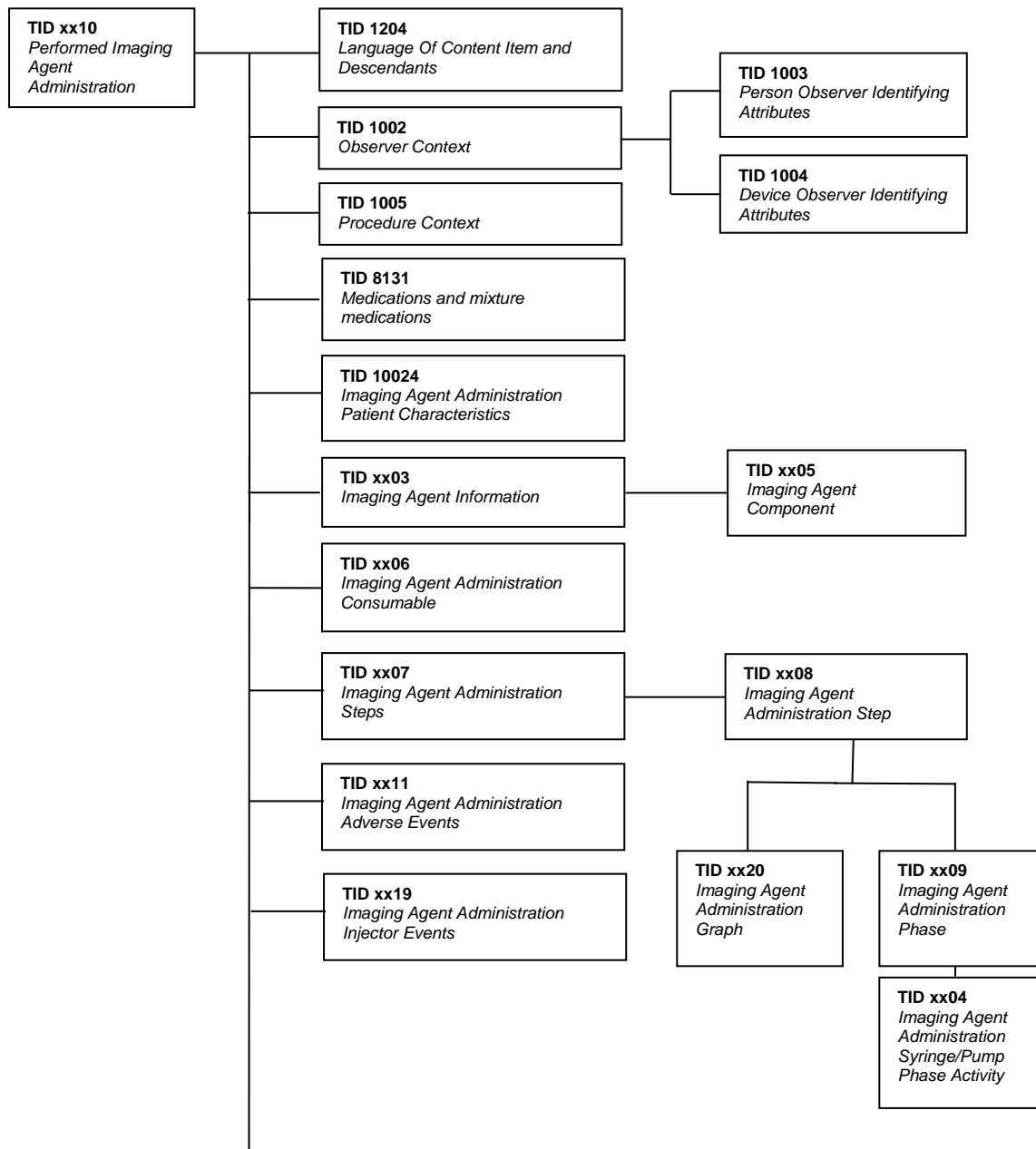


Figure A.x-2: Performed Imaging Agent Administration SR IOD Template Structure

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.

425

430

**Add TID xx10 as shown.**

435

<b>TID xx10</b>								
<b>Performed Imaging Agent Administration</b>								
<b>Type : Extensible Order : Non-Significant Root: Yes</b>								
	<b>NL</b>	<b>Rel with Parent</b>	<b>VT</b>	<b>Concept Name</b>	<b>VM</b>	<b>Req Type</b>	<b>Condition</b>	<b>Value Set Constraint</b>
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 Consumable	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	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	Describes what was delivered.
Row 11	This reference will 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).

440 **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.

445 **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 (231) "Yes-No Only"
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	UIDREF	EV (newcodexxx, 99SUP164, "Referenced Imaging Agent Administration Phase UID")	1	U		
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 3 of TID (xx08)) where the adverse event occurred.
Row 9	UID of the performed phase (as recorded in row 3 of TID (xx09)) where the adverse event occurred.

450

**Add TID xx19 as shown.**

**TID xx19 Imaging Agent Administration Injector Events**

455

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 (231) "Yes-No Only"
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	UIDREF	EV (newcodexxx, 99SUP164, "Referenced Imaging Agent Administration Phase UID")	1	U		
7	>>	HAS PROPERTIES	TEXT	EV (newcode3001, 99SUP164, "Referenced Imaging Agent Identifier")	1	U		Shall be as defined in DTID (xx03) EV(newcode3000, 99SUP164, "Imaging Agent Identifier")

460

**Content Item Descriptions**

Row 4	Date and time of occurrence of the injector event.
Row 5	UID of the performed step (as recorded in row 3 of TID (xx08)) where the injector event occurred.
Row 6	UID of the performed phase (as recorded in row 3 of TID (xx09)) where the injector event occurred.
Row 7	The imaging agent being administered when the event was detected.

**TID xx20      Imaging Agent Administration Graph**

465      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 (newcode1000, 99SUP164, "Imaging Agent Administration Graph")	1	M		
2	>	CONTAINS	TEXT	EV (newcode3001, 99SUP164, "Referenced Imaging Agent Identifier")	1	M		EV(newcode3000, 99SUP164, "Imaging Agent Identifier")
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")

470 **Content Item Descriptions**

Row 2	Identifies the imaging agent represented in the graph. Will be as defined in DTID (xx03).
-------	---



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

475 **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
<i>Include CID 9301 "Modality PPS Discontinuation Reasons"</i>		
<i>Include CID 9302 "Media Import PPS Discontinuation Reasons"</i>		
<b><i>Include CID xx1 "Imaging Agent Administration Adverse Events"</i></b>		

480

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

**CID xx1 Imaging Agent Administration Adverse Events**

This Context Group includes contrast reactions listed in the ACR Manual of Contrast Media.

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

485

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)	SNOMED-CT Concept ID
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	
SCT	724232004	Sensation of being warm (finding)	
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	4386001
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	Cardiac Arrhythmia	698247007
SRT	D2-60262	Cardiorespiratory arrest	410430005
SRT	D0-B0330	Injection Site Extravasation	
DCM	110515	Patient condition prevented continuing	
<i>Include CID 10043 "Intravenous Extravasation Symptoms"</i>			

**CID xx2      Time Relative To Procedure**

**Context ID xx2  
Time Relative To Procedure**

**Type: Extensible      Version: 201xxxxx**

490

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

**CID xx4 Imaging Agent Administration Phase Type**

495

**Context ID xx4**

**Imaging Agent Administration Phase Type**

**Type: Extensible Version: 201xxxxx**

<b>Coding Scheme Designator (0008,0102)</b>	<b>Code Value (0008,0100)</b>	<b>Code Meaning (0008,0104)</b>
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

**500 CID xx8 Imaging Agent Administration Mode**

**Context ID xx8**

**Imaging Agent Administration Mode**

**Type: Extensible Version: 201xxxxx**

<b>Coding Scheme Designator (0008,0102)</b>	<b>Code Value (0008,0100)</b>	<b>Code Meaning (0008,0104)</b>	
DCM	newcode081	Automated Administration	
DCM	newcode082	Manual Administration	

**505 CID xx9 Imaging Agent Administration Patient State**

**Context ID xx9**

**Imaging Agent Administration Patient State**

**Type: Extensible Version: 201xxxxx**

<b>Coding Scheme Designator (0008,0102)</b>	<b>Code Value (0008,0100)</b>	<b>Code Meaning (0008,0104)</b>	<b>SNOMED-CT Concept ID</b>
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	Malignant epithelial neoplasm of thyroid	448216007
DCM	110503	Patient allergic to media/contrast	

510

**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**

515

<b>Coding Scheme Designator (0008,0102)</b>	<b>Code Value (0008,0100)</b>	<b>Code Meaning (0008,0104)</b>	<b>Trade Name (Informative)</b>
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	
<i>Include CID xx13 "Medication for Imaging Agent Administration"</i>			

**CID xx13 Medication for Imaging Agent Administration**

520

**Context ID xx13  
Medication for Imaging Agent Administration  
Type: Extensible Version: 201xxxxx**

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)	SNOMED-CT Concept ID	UMLS Concept Unique ID
SRT	F-61B48	Propofol	387423006	C0033487
SRT	F-6183C	Midazolam	373476007	C0026056
SRT	49998007	Sufentanil		
SRT	386839004	Remifentanil		
SRT	F-61C65	Alfentanil	387560008	

**CID xx17 Imaging Agent Administration Completion Status**

525

**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 Unit of Presentation**

530

**Context ID xx18  
Imaging Agent Administration Pharmaceutical Unit of Presentation  
Type: Extensible Version: 201xxxxx**

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)	SNOMED-CT Concept ID
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SRT	.	Syringe	733020007
SRT	R-FEEFF	Cartridge	706440002
SRT	R-FCBB8	Parenteral/enteral solution bag	464557001
SRT	A-27500	Bottle	68276009

Note: The concept for syringe (unit of presentation) is used in this context group as distinct from syringe (physical object), which is used in CID xx19. This is intended for pre-filled syringes.

535

**CID xx19 Imaging Agent Administration Consumables**

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

<b>Coding Scheme Designator (0008,0102)</b>	<b>Code Value (0008,0100)</b>	<b>Code Meaning (0008,0104)</b>	<b>SNOMED-CT Concept ID</b>
SCT	61968008	Syringe	
SRT	A-26800	Catheter	
SRT	R-FDF5C	Contrast medium injection system manifold kit	
SRT	A-26400	Tube, device (physical object)	
SRT	A-30360	Needle	79068005
SRT	A-27500	Bottle	68276009

540

Note: The concept for syringe (physical object) is used in this context group as distinct from syringe (unit of presentation), which is used in CID xx18. The concept for bottle is used in the context of consumable used during an oral administration of contrast.

**545 CID xx20 Flush**

**Context ID xx20**  
**Flush**  
**Type: Extensible      Version: 201xxxxx**

<b>Coding Scheme Designator (0008,0102)</b>	<b>Code Value (0008,0100)</b>	<b>Code Meaning (0008,0104)</b>

SRT	C-A7220	Dextran
SRT	C-70841	Saline
SRT	C-70434	Lactated Ringer's

550 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**

560

<b>Coding Scheme Designator (0008,0102)</b>	<b>Code Value (0008,0100)</b>	<b>Code Meaning (0008,0104)</b>
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.***

565

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

**Type: Extensible**

**Version: 201xxxxx**

570

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**

575

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



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

<b>Coding Scheme Designator (0008,0102)</b>	<b>Code Value (0008,0100)</b>	<b>Code Meaning (0008,0104)</b>	<b>SNOMED-CT Concept ID</b>
SRT	A-26836	Peripheral intravenous catheter	82449006
SRT	A-26810	Central venous catheter	52124006
SRT	A-1450B	Implantable venous access port	
SRT	A-26810	Peripherally inserted central catheter	
SRT	R-FEAEC	Rectal Catheter	

585 **CID xx26 Low-High****Context ID xx26****Low-High****Type: Non-Extensible Version: 201xxxxx**

<b>Coding Scheme Designator (0008,0102)</b>	<b>Code Value (0008,0100)</b>	<b>Code Meaning (0008,0104)</b>	<b>SNOMED-CT Concept ID</b>
SRT	G-A374	Low	62482003
SRT	G-A373	High	75540009
SRT		Equal	9726003

**CID xx30 Medication Type Code Type for Pre-Medication**

Context ID xx30

**Medication Type Code Type for Pre-Medication**

Type: Extensible Version: 201xxxxx

595

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)	SNOMED-CT Concept ID
DCM	123012	Pre-Medication	
99SUP164	newcode6009	Contrast Reaction Prophylactic Agent	
SRT		Sedative	372614000
SRT	C-85800	Antiemetic	52017007

**Add to PS 3.16 Annex D**

600

**Annex D DICOM Controlled Terminology Definitions (Normative)**

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.

**605 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 pre-filled 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.	
Newcode080	Manually Triggered Injection Information	Information only available if injection was triggered manually.	
Newcode081	Automated Administration	An administration mode where the fluid is delivered by a mechanical injector system.	
Newcode082	Manual Administration	An administration mode where the substance is delivered manually E.g., Clinician manual injection of an imaging agent or oral consumption by a patient.	
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. Also referred to as r2. Typically expressed in units l/mmol/s.	
newcode555	Is Ionic	Indicates whether the imaging agent is ionic or non-ionic.	
newcode556	Dosing Factor	Indicates normalized dose of imaging agent per kg of patient weight. Typically recommended by the vendor. For e.g., grams Iodine per Kg (gl / Kg).	
newcode557	Imaging Agent Component Usage	Information about use of imaging agent component(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.	
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 individual administration step in the imaging agent administration plan.	
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.	
newcode584	Scan Delay	Time delay for start of image acquisition after start of imaging agent administration.	
newcode585	Imaging Agent Administration Steps Description	Description of imaging agent administration plan.	
newcode586	Imaging Agent Administration Protocol Name	Protocol name for imaging agent administration.	
newcode587	Imaging Agent Administration Protocol Identifier	Identifies an injection protocol at the injector workstation that generates a customized administration steps for a patient for the purpose of administration of an imaging agent.	
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	Type of phase in an imaging agent 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 injector 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	Can be configured to execute a series of steps (within this document called phases) automatically.	
newcode713	Number of Injector Heads	Number of injector heads or pumps (Single or dual or many) in an injector device.	
newcode715	Administration discontinued	Whether the imaging agent administration was discontinued.	
newcode800	Imaging Agent Volume Per Unit of Presentation	The volume of imaging agent present in one unit of presentation. The capacity of the unit of presentation may be larger than this.	
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	Is Consumable New	If the consumable is installed newly during the preparation process for this Imaging Agent Administration.	
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. This is typically specified by the prescribing health care professional for patient safety and quality purposes.	
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.	
newcode1000	Imaging Agent Administration Graph	Information about two dimensional graph data for a syringe or pump.	
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.	
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.	
newcode1113	Peak Pressure in Phase Activity	Peak pressure value detected at a location (syringe or pump) during a single administration phase activity.	
newcode1114	Imaging Agent Administration Performed Step UID	Unique identification of a single performed imaging agent administration step actually delivered on a specific occasion	
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 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 Identifier	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 Identifier	The identifier of an imaging agent being referenced.	
newcode4000	Consumable Index	Identifies a consumable uniquely within a list of consumables.	
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 during Imaging Agent Administration. E.g., contrast, stress agent or flush.	
newcode6009	Contrast Reaction Prophylactic Agent	A pharmaceutical agent administered as a pre-medication to prevent contrast reactions.	

610

## 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:*

615

### Annex XX Imaging Agent Administration Report Template (Informative)

#### XX.1 PURPOSE OF THIS ANNEX

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

620

A Planned Imaging Agent Administration SR object is intended for representing the plan or program to deliver contrast agent to the patient for a contrast study. It could be prepared and customized for a patient by the radiologist, prior to the study. The plan may also be altered by the operating technologist prior to the study. For example, the injection plan might be adjusted for patient's condition such as weight. The plan is then loaded into the injector system to be performed.

625

A Performed Imaging Agent Administration SR object is for reporting the actual program that was used to deliver the contrast agent during the study. During the study, the contrast-delivery system may alter the original delivery plan as a result of events that occur during the delivery of imaging agent such as limiting the flow rate due to high pressure, aborting the injection due to adverse events etc. The Performed Image Agent Administration SR is then saved.

630

The infusion manager sends the Performed Imaging Agent Administration SR to the PACS and optionally to other destinations like acquisition modality, RIS, reporting system.

Figure xx-1 illustrates possible consumers of the Performed Imaging Agent Administration SR object (referred as "Imaging Agent Administration SR" in figure below) post administration.

635

Note: In the following use cases, the word event means a combination of injector and adverse events.

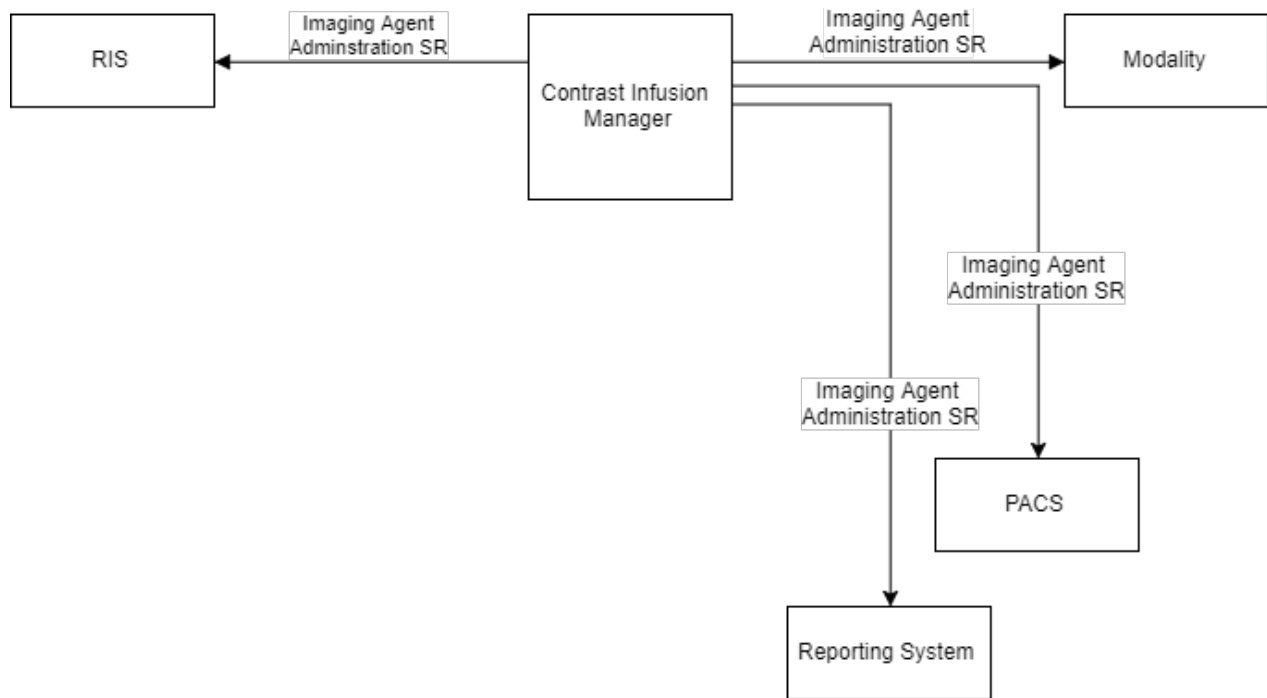


Figure xx-1

640

645

650

### Use Case 1 – Manual Bolus Injection

655 This use case (See figure xx-1a) gives an example of how a performed object can capture a manual contrast infusion. The operator performs a manual administration of contrast for a study. The operator selects the patient from the contrast infusion manager (available through modality worklist) and reports the minimum parameters about the injection. The contrast infusion manager then generates a Performed Imaging Administration SR object and sends to the Contrast Usage Consumer such as PACS.

660

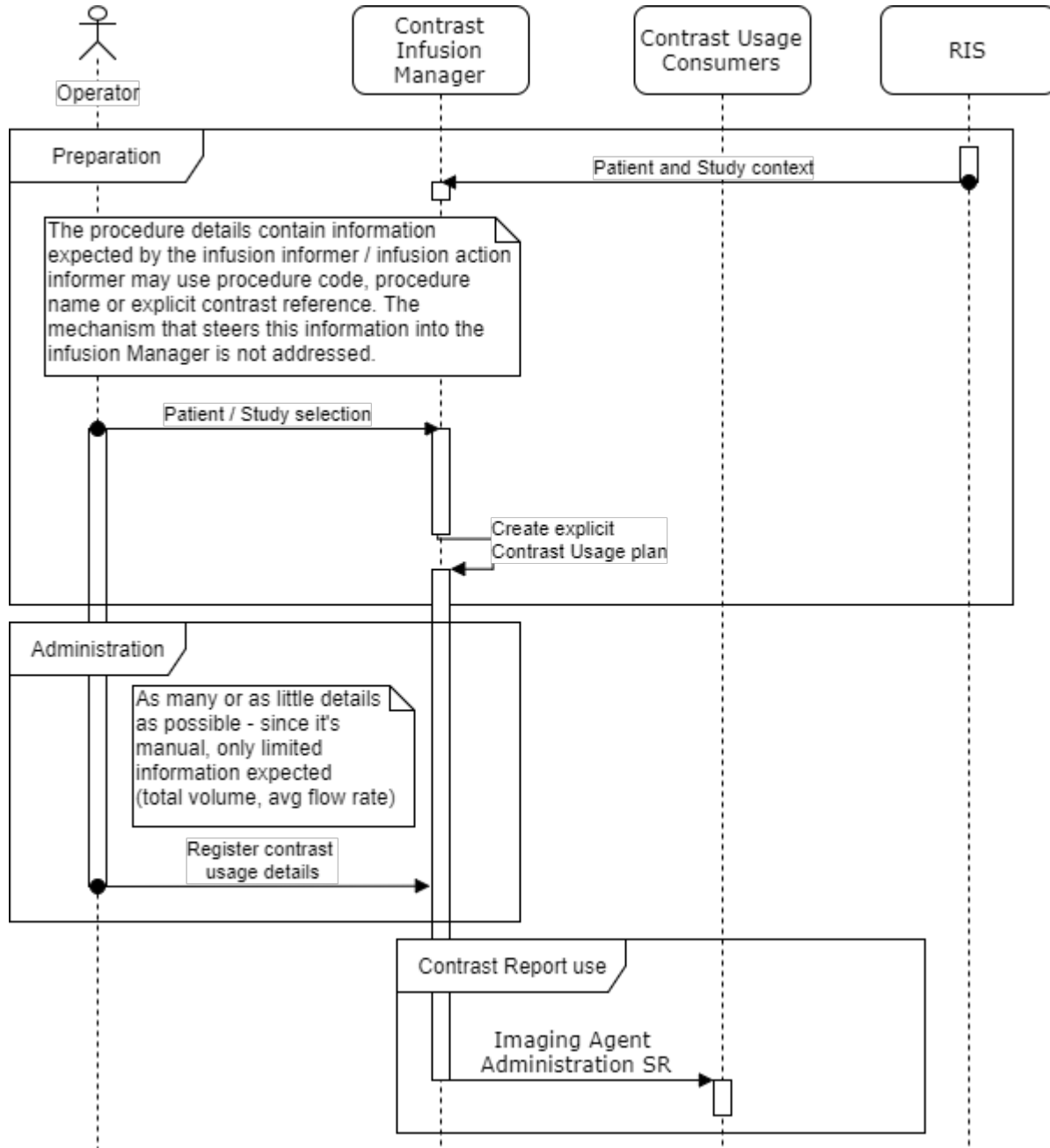
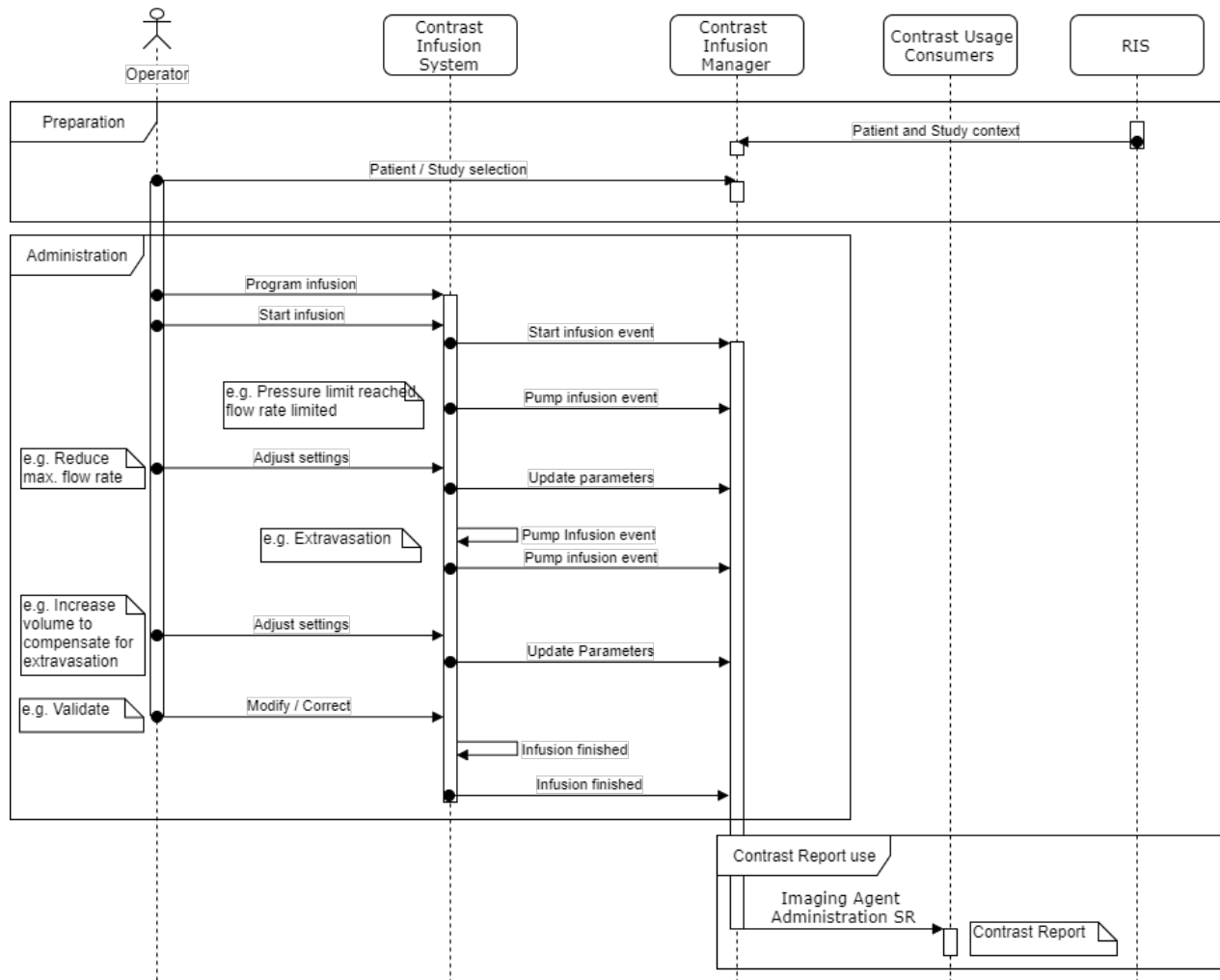


figure xx-1a

**Use Case 2 – Automatic Infusion Pump – Contrast Reporting**

665 This use case (See figure xx-2) gives an example of how a performed object could be used for capturing an automatic infusion. The technologist selects a patient at the infusion manager from the 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.

670 Upon completion of the administration procedure, the infusion manager generates a Performed Imaging Agent Administration SR object using the injection data obtained from the injection system and including the events and updated parameters that were captured during the administration. The generated report is then sent to the PACS and other contrast usage consumers.

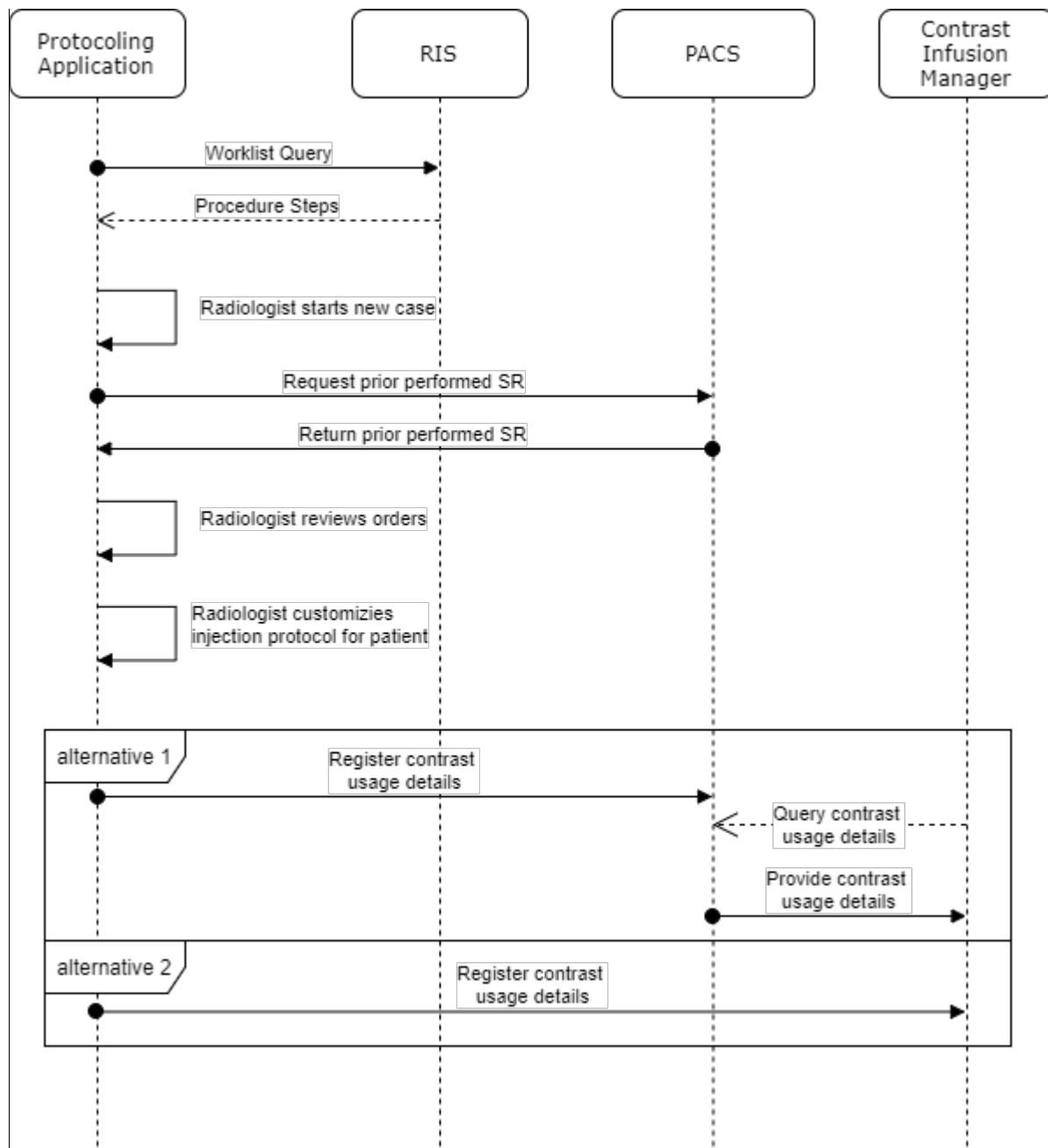


675

Figure xx-2

**Use Case 3 – Protocols**

680 This use case (see figure xx-3) gives an example on how a planned object could be used. The radiologist uses the protocoling application in order to plan the contrast administration protocol for a patient. The protocoling application outputs the planned object into the infusion manager for immediate use or to the RIS or PACS. The planned object is used by the technologist during the study.



685

figure xx-3

**Use Case 4 - Consumption of the Contrast Information by Reporting Systems for automated documentation**

690 This use case gives an example of how a Performed Imaging Agent Administration SR object could be used for capturing summary values of contrast into a radiology reporting system. In this case, the radiology reporting system would be a Contrast Usage Consumer (figure xx-2).

695 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 this data for completeness of study documentation. Ostensibly, contrast data included in reports may be used to construct a longitudinal record of contrast exposure for a patient undergoing multiple imaging studies.

700 Data of primary importance in this workflow are the summary values of contrast administered to the patient (total volume of contrast, saline, flow rate and concentration/type of contrast used). Often, information describing the vascular access device used (e.g., catheter gauge) is clinically relevant and/or mandated.

705 The guidance from ACR [ACR Guideline] about the procedures and materials description in the report body states, "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."

**XX.2 Informative References**

710 [ACR Guideline] *ACR Practice Parameters and Technical Standards*. Resolution 11, Revision 2014. Section II.3.a "American College of Radiology's Practice Guideline for Communication of Diagnostic Imaging Findings". <https://www.acr.org/-/media/ACR/Files/Practice-Parameters/CommunicationDiag.pdf>

715

720



## Annex YYY Performed Imaging Agent Administration Structured Report (Informative)

725

### YYY.1

This Annex describes the use of Imaging Agent Administration Structured Report objects.

#### YYY.1.1 Performed Imaging Agent Administration Structured Report

This Section contains examples for use cases involving contrast imaging of a single patient in CT system.

730 In the basic use case:

- Patient was scheduled by RIS system with a study UID and accession number.
- An Injection procedure for the study was described by an IAASR plan object.  
(An object of this type is exemplified in YYY.1.2.)
- 735 • Patient suffers from insufficient renal function, so intravenous (i.v.) contrast agents were dissolved to achieve necessary volumes.
- Before i.v. contrast was administered a 10 mg Prednisone injection was given to the patient.
- After connecting the patient to the injection system, a patency test injection was done. (The injection system does not record detailed graph information of this.)
- “Keep vein open” was activated at a rate of 1 ml per minute.
- 740 • The Requested Procedure was a CT abdominal study with both i.v. and oral contrast administration.
  - Oral contrast media OralContrastofin was diluted to 25:1000 as given in the drug usage description. 1000 ml of oral contrast media was given 2 hours in advance of the procedure. (Preparation of 1000 ml solution uses 24.4 ml contrast and 975.6 ml water)
  - 745 • Test bolus and Imaging injection phase was done at 3 ml/s and were followed by a 30 ml flush at the same flow rate.
  - Before the diagnostic injection, a test bolus of 10 ml undiluted ContrastStuff 370 contrast was given, in order to determine scan delay time for the diagnostic injection.
  - 750 • Finally 88 ml i.v. contrast media ContrastStuff 370 (corresponding to 0.5 g iodine / kg body weight for a 65 kg person) was given during imaging. Due to the high viscosity of the contrast and renal insufficiency of the patient, ContrastStuff 370 was diluted 1:1 with 88 ml flush on the fly during injection.

The content tree structure would resemble:

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
1	Performed Imaging Agent Administration		TID xx10
1.1	Language of Content Item and Descendants	English	TID xx10 TID 1204
1.1.1	Country of Language	United States	TID 1204

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
1.2	Observer Type	Person	TID 1002 CID 270
1.3	Person Observer Name	Doe^Jane	TID 1003
1.4	Observer Type	Device	TID 1002 SINCE Observer Type is Device
1.5	Device Observer UID	1.2.3.4.47110815.1	TID 1004
1.6	Device Observer Manufacturer	Injector Corporation	TID 1004
1.7	Device Observer Model Name	XYZ INJECTOR	TID 1004
1.8	Device Observer Serial Number	1234567890	TID 1004
1.9	Station AE Title	XYZINJAET	TID 1004
1.10	Procedure Study Instance UID	1.2.3.4.47110815.2	TID 1005 Defaults to Study Instance UID (0020,000D) of General Study Module
1.11	Accession Number	123456789	TID 1005 Defaults to (0008,0050)
1.12	Medication given		TID 8131
1.12.1	Route of administration	(SRT,G-D101,"Intravenous route")	TID 8131 CID 11
1.12.2	Mixture		TID 8131
1.12.2.1	Drug administered	Prednisone	TID 8131 row 7
1.12.2.2	Medication Type	(99SUP164, newcode6009, "Contrast Reaction Prophylactic Agent")	TID 8131 CID xx30
1.12.2.3	Dosage	2 ml	TID 8131 CID 82 (Units)
1.12.2.4	Concentration	5 mg/ml	TID 8131 CID 82 (Units)
1.13	Patient Characteristics		TID 10024
1.13.1	Patient State	(SRT, R-102B6, "History of renal failure")	TID 10024 CID xx9
1.13.2	Subject Age	25	TID 10024 CID 7456 UNITS=EV(a,UCUM,"year")
1.13.3	Subject Sex	(DCM, M,"Male")	TID 10024 CID 7455
1.13.4	Patient Height	175	TID 10024 UNITS=EV(cm,UCU M,"cm")
1.13.5	Patient Weight	65	TID 10024

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
			UNITS=EV(kg,UCUM,"kg")
1.13.6	Body Mass Index	21.23	TID 10024 UNITS=EV(kg/m2,UCUM,"kg/m2")
1.13.7	Equation	(122265, DCM, "BMI=Wt/Ht^2")	TID 10024
1.13.8	Serum Creatinine	2.7	TID 10024 UNITS=DT(mg/dl,UCUM,"mg/dl")
1.13.9	Glomerular Filtration Rate	38	TID 10024 UNITS=DT(ml/min{1.73_m2},UCUM,"ml/min/1.73m2")
1.13.9.1	Measurement Method	(DCM, 113570, "Cockcroft-Gault Formula estimation of GFR")	TID 10024 CID 10047
1.13.9.2	Equivalent meaning of concept name	(LN,33914-3,"Glomerular Filtration Rate (MDRD)")	TID 10024 CID 10046
1.14	Imaging Agent Information		TID xx03
1.14.1	Imaging Agent Identifier	INJECTOR_CONTRAST_AGENT	TID xx03
1.14.2	Imaging Agent Warmed	(SRT,R-0038D,"Yes")	TID xx03 CID 231
1.14.3	Imaging Agent Component Usage		TID xx03
1.14.3.1	Imaging Agent Component		TID xx05
1.14.3.1.1	Drug administered	(SRT,C-B0382,"Iopromide")	TID xx05 CID 12
1.14.3.1.2	Active Ingredient	(SRT,C-11400,"Iodine")	TID xx05 CID 13
1.14.3.1.3	Concentration	370	TID xx05 UNITS = EV (mg/ml, "UCUM", "mg/ml")
1.14.3.1.4	Osmolality at 37°	770	TID xx05 UNITS=EV(mosm/kg, UCUM,"mosmol/kg")
1.14.3.1.5	Viscosity at 37°	10	TID xx05 UNITS = EV (cP, "UCUM", "centi Poise")
1.14.3.1.6	Unit of Presentation	(SRT,A-27500,"Bottle")	TID xx05 CID xx18
1.14.3.1.7	Imaging Agent Volume Per Unit of Presentation	500	TID xx05 UNITS=EV(ml,UCUM,"ml")
1.14.3.1.8	Medical Product Expiration Date	20190301	TID xx05
1.14.3.1.9	Manufacturer Name	ContrastMed Corp	TID xx05

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
1.14.3.1.10	Brand Name	ContrastStuff 370	TID xx05
1.14.3.1.11	Barcode Value	-07363935	TID xx05 PZN number
1.14.3.1.12	Lot Identifier	4B17010	TID xx05
1.14.3.2	Component Volume	97.84	TID xx03 UNITS=EV(ml,UCUM,"ml")
1.15	Imaging Agent Information		TID xx03
1.15.1	Imaging Agent Identifier	INJECTOR_FLUSH_AGENT	TID xx03
1.15.2	Imaging Agent Warmed	(SRT,R-0038D,"Yes")	TID xx03 CID 231
1.15.3	Imaging Agent Component Usage		TID xx03
1.15.3.1	Imaging Agent Component		TID xx05
1.15.3.1.1	Drug administered	(SRT,C-70841,"Saline")	TID xx05 CID xx20
1.15.3.1.2	Unit of Presentation	(SRT,A-27500,"Bottle")	TID xx05 CID xx18
1.15.3.1.3	Imaging Agent Volume Per Unit of Presentation	500	TID xx05 UNITS=EV(ml,UCUM,"ml")
1.15.3.1.4	Manufacturer Name	Saline Water Corp	TID xx05
1.15.3.1.5	Brand Name	Isotonic Natriumchloride Solution	TID xx05
1.15.3.1.6	Barcode Value	-00854309	TID xx05 PZN number
1.15.3.1.7	Lot Identifier	13CQ4857	TID xx05
1.15.3.2	Component Volume	200	TID xx03 UNITS=EV(ml,UCUM,"ml")
1.16	Imaging Agent Information		TID xx03
1.16.1	Imaging Agent Identifier	ORAL_CONTRAST_AGENT	TID xx03
1.16.2	Imaging Agent Warmed	(SRT,R-00339,"No")	TID xx03 CID 231
1.16.3	Imaging Agent Component Usage		TID xx03
1.16.3.1	Imaging Agent Component		TID xx05
1.16.3.1.1	Drug administered	(SRT,C-B0345,"Meglumine diatrizoate")	TID xx05 CID 12
1.16.3.1.2	Active Ingredient	(SRT,C-11400,"Iodine")	TID xx05 CID 13
1.16.3.1.3	Concentration	370	TID xx05 UNITS = EV (mg/ml, "UCUM", "mg/ml")
1.16.3.1.4	Viscosity at 37°	8.9	TID xx05

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
			UNITS = EV (cP, "UCUM", "centi Poise")
1.16.3.1.5	Unit of Presentation	Bottle	TID xx05 CID xx18
1.16.3.1.6	Imaging Agent Volume Per Unit of Presentation	100	TID xx05 UNITS=EV(ml,UCUM,"ml")
1.16.3.1.7	Manufacturer Name	ContrastMed Corp	TID xx05
1.16.3.1.8	Brand Name	OralContrastofin	TID xx05
1.16.3.1.9	Barcode Value	-00408497	TID xx05 PZN number
1.16.3.1.10	Lot Identifier	6X14325	TID xx05
1.16.3.2	Component Volume	24.4	TID xx03 UNITS=EV(ml,UCUM,"ml")
1.16.4	Imaging Agent Component Usage		TID xx03
1.16.4.1	Imaging Agent Component		TID xx03 TID xx05
1.16.4.1.1	Drug administered	(SRT,C-10120,"Water")	TID xx05 CID 12
1.16.4.1.2	Unit of Presentation	(SRT,A-27500,"Bottle")	TID xx05 CID xx18
1.16.4.1.3	Imaging Agent Volume Per Unit of Presentation	1000	TID xx05 UNITS=EV(ml,UCUM,"ml")
1.16.4.1.4	Manufacturer Name	Fresh Water Corp	TID xx05
1.16.4.1.5	Brand Name	BestWaterEver	TID xx05
1.16.4.1.6	Barcode Value	-4801694	TID xx05 PZN number
1.16.4.2	Component Volume	975.6	TID xx03 UNITS=EV(ml,UCUM,"ml")
1.17	Summary	Administered 1000 ml of OralContrastofin via oral route and 88ml of ContrastStuff 370 via intravenous route in Left Arm Vein..	TID xx10
1.18	Imaging Agent Administration Consumable		TID xx06
1.18.1	Imaging Agent Administration Consumable Type	(SRT,R-FDF5C,"Contrast medium injection system manifold kit")	TID xx06 CID xx19
1.18.2	Quantity of Material	1	TID xx06
1.18.2.1	Is Consumable New	(SRT,R-00339,"No")	TID xx06 CID 231
1.18.3	Billing Code	317627C	TID xx06

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
1.18.4	Medical Product Expiration Date	20221031	TID xx06
1.18.5	Manufacturer Name	Injector Corp	TID xx06
1.18.6	Barcode Value	(01)14250299676272(19)13111501(17)181000	TID xx06
1.18.7	Lot Identifier	13111501	TID xx06
1.19	Imaging Agent Administration Consumable		TID xx06
1.19.1	Imaging Agent Administration Consumable Type	(SRT,A-30360,"Needle")	TID xx06 CID xx19
1.19.2	Quantity of Material	1	TID xx06
1.19.2.1	Is Consumable New	(SRT,R-0038D,"Yes)	TID xx06 CID 231
1.19.3	Billing Code	206342	TID xx06
1.19.4	Medical Product Expiration Date	20181130	TID xx06
1.19.5	Manufacturer Name	Dr. Poke Inc.	TID xx06
1.19.6	Brand Name	Sterile Standard, Green	TID xx06
1.20	Imaging Agent Administration Consumable		TID xx06
1.20.1	Imaging Agent Administration Consumable Type	(SRT,A-27500,"Bottle")	TID xx06 CID xx19
1.20.2	Quantity of Material	1	TID xx06
1.20.2.1	Is Consumable New	(SRT,R-0038D,"Yes)	TID xx06 CID 231
1.20.3	Billing Code	47110815	TID xx06
1.20.4	Medical Product Expiration Date	20191001	TID xx06
1.21	Imaging Agent Administration Steps		TID xx07
1.21.1	Imaging Agent Administration Steps Name	Abdomen intestinal and vessel contrast processing	TID xx07
1.21.2	Imaging Agent Administration Steps Description	This contrast processing is given by an oral administration of first 2 hours in advance of the procedure. I.v. administration is done with a pre-inject to determine scan delay time. Patent test injection applies as a default procedure.	TID xx07
1.21.3	Imaging Agent Administration Step		TID xx08
1.21.3.1.	Imaging Agent Administration Step Identifier	ORAL_STEP_1	TID xx08
1.21.3.2	Imaging Agent Administration Performed Step UID	1.2.3.4.47110815.3	TID xx08

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
			SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.3.3	Administration Mode	(DCM, newcode082,"Manual Administration")	TID xx08 CID xx8
1.21.3.4	Person Role in Organization	(SRT, 121025,"Patient")	TID xx08 CID 7450  SINCE "Administration Mode" IS "Manual Administration", condition holds (self-administration)
1.21.3.5	Administration Step Type	(DCM, newcode1118,"Diagnostic Administration")	TID xx08 CID xx23
1.21.3.6	Scan Delay	7200	TID xx08 UNITS = EV (s, UCUM, "s")
1.21.3.7	Route of Administration	(SRT,G-D140,"Oral route")	TID xx08 CID 11
1.21.3.8	Imaging Agent Administration Phase		TID xx09
1.21.3.8.1	Imaging Agent Administration Phase Identifier	ORAL_PHASE	TID xx09
1.21.3.8.2	Imaging Agent Administration Performed Phase UID	1.2.3.4.47110815.4	TID xx09  SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.3.8.3	Imaging Agent Administration Syringe/Pump Phase Activity		TID xx04
1.21.3.8.3.1	Referenced Imaging Agent Identifier	ORAL_CONTRAST_AGENT	TID xx04  Value of 1.16.1
1.21.3.8.3.2	Volume Administered	1000	TID xx04 UNITS = EV (ml, UCUM, "ml")  Same value as 1.21.3.8.4
1.21.3.8.3.3	Starting Flow Rate of administration	0.37	TID xx04 UNITS = EV (ml/s, UCUM "ml/s")

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
			Calculated value: 1000ml /2700s
1.21.3.8.3.4	DateTime Started	20181012101531	TID xx04  SINCE root Concept Name IS "Performed Imaging Agent Administration"
1.21.3.8.3.5	Duration	2700	TID xx04 UNITS = EV (s, UCUM, "s")  SINCE root Concept Name IS "Performed Imaging Agent Administration"
1.21.3.8.4	Total Phase Volume Administered	1000	TID xx09 UNITS = EV (ml, UCUM, "ml")  Same value as 1.21.3.8.3.2
1.21.3.8.5	DateTime Started	20181012101531	TID xx09  SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.3.8.6	Duration	2700	TID xx09 UNITS = EV (s, UCUM, "s")  SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.4	Imaging Agent Administration Step		TID xx08
1.21.4.1	Imaging Agent Administration Step Identifier	EXTRAVASATION_TEST_STEP_2	TID xx08
1.21.4.2	Imaging Agent Administration Performed Step UID	1.2.3.4.47110815.5	TID xx08  SINCE "Root Concept Name Code Sequence" IS



Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
			"Performed Imaging Agent Administration"
1.21.4.3	Administration Mode	(DCM,newcode081,"Automated Administration")	TID xx08 CID xx8
1.21.4.4	Administration Step Type	(DCM,newcode1116,"Patency Test Injection")	TID xx08 CID xx23
1.21.4.5	Route of Administration	(SRT,G-D101,"Intravenous route")	TID xx08 CID 11
1.21.4.5.1	Site of	(SRT,G-D0C6,"Via arm vein")	TID xx08 CID 3746  SINCE "Route of Administration" IS "Intravenous route"
1.21.4.5.1.1	Laterality	(SRT,G-A101,"Left")	TID xx08 CID 244  SINCE "Site of" IS "Via arm vein"
1.21.4.6	Imaging Agent Administration Phase		TID xx09
1.21.4.6.1	Imaging Agent Administration Phase Identifier	EXTRAVASATION_TEST_PHASE	TID xx09
1.21.4.6.2	Imaging Agent Administration Performed Phase UID	1.2.3.4.47110815.6	TID xx09  SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.4.6.3	Imaging Agent Administration Phase Type	(DCM,newcode064,"Automatic with Manual Inject Phase")	TID xx09 CID xx4  SINCE 1.21.4.3 (Administration Mode) IS "Automated Administration"
1.21.4.6.4	Imaging Agent Administration Syringe/Pump Phase Activity		TID xx04
1.21.4.6.4.1	Referenced Imaging Agent Identifier	INJECTOR_FLUSH_AGENT	TID xx04  Value of 1.15.1
1.21.4.6.4.2	Volume Administered	30	TID xx04 UNITS = EV (ml, UCUM, "ml")  Same value as 1.21.4.6.5 and 1.21.4.9.1

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
1.21.4.6.4.3	Starting Flow Rate of administration	3	TID xx04 UNITS = EV (ml/s, UCUM "ml/s")
1.21.4.6.4.4	Peak Flow Rate in Phase Activity	3	TID xx04 UNITS = EV (ml/s, UCUM "ml/s")  SINCE 1.21.4.3 (Administration Mode) IS "Automated Administration" AND "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.4.6.4.5	Peak Pressure in Phase Activity	2.5	TID xx04 UNITS = EV (kPa, UCUM "kPa")  SINCE 1.21.4.3 (Administration Mode) IS "Automated Administration" AND "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.4.6.4.6	Initial Volume of Imaging Agent in Container	197	TID xx04 UNITS = EV (ml, UCUM, "ml")  SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.4.6.4.7	Residual Volume of Imaging Agent in Container	167	TID xx04 UNITS = EV (ml, UCUM, "ml")  SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.4.6.4.8	DateTime Started	20181012121537	TID xx04  SINCE root Concept Name IS "Performed Imaging Agent Administration"
1.21.4.6.4.9	Duration	10	TID xx04

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
			UNITS = EV (s, UCUM, "s")  SINCE root Concept Name IS "Performed Imaging Agent Administration"
1.21.4.6.5	Total Phase Volume Administered	30	TID xx09 UNITS = EV (ml, UCUM, "ml")  In this case the same value as 1.21.4.6.4.2 and 1.21.4.9.1
1.21.4.6.6	DateTime Started	20181012121537	TID xx09  SINCE root Concept Name Code Sequence IS "Performed Imaging Agent Administration"
1.21.4.6.7	Duration	10	TID xx09 UNITS = EV (s, UCUM, "s")  SINCE root Concept Name Code Sequence IS "Performed Imaging Agent Administration")
1.21.4.7	Number of Injector Heads	2	TID xx08
1.21.4.8	Programmable Device	(SRT,R-0038D,"Yes)	TID xx08 CID 231
1.21.4.9	Manually triggered injection information		TID xx08  SINCE 1.21.4.3 (Administration Mode) IS "Automated Administration" AND root Concept Name Code Sequence IS "Performed Imaging Agent Administration"
1.21.4.9.1	Total Step Volume Administered	30	TID xx08 UNITS = EV (ml, UCUM, "ml")

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
			In this case the same value as 1.21.4.6.4.2 and 1.21.4.6.5  SINCE 1.21.4.9 IS CODED
1.21.4.9.2	Total number of manually triggered injections	1	TID xx08  SINCE 1.21.4.9 IS CODED
1.21.5	Imaging Agent Administration Step		TID xx08
1.21.5.1	Imaging Agent Administration Step Identifier	DELAY_ESTIMATE_STEP_3	TID xx08
1.21.5.2	Imaging Agent Administration Performed Step UID	1.2.3.4.47110815.7	TID xx08  SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.5.3	Administration Mode	(DCM,newcode081,"Automated Administration")	TID xx08 CID xx8
1.21.5.4	Administration Step Type	(DCM,newcode1117,"Transit Time Test Injection")	TID xx08 CID xx23
1.21.5.5	Pressure Limit	15	TID xx08 UNITS = EV (kPa, UCUM "kPa")  SINCE 1.21.5.3 IS "Automated Administration"
1.21.5.6	Route of Administration	(SRT,G-D101,"Intravenous route")	TID xx08 CID 11
1.21.5.6.1	Site of	(SRT,G-D0C6,"Via arm vein")	TID xx08 CID 3746  SINCE "Route of Administration" IS "Intravenous route"
1.21.5.6.1.1	Laterality	(SRT,G-A101,"Left")	TID xx08 CID 244  SINCE "Site of" IS "Via arm vein"
1.21.5.7	Imaging Agent Administration Phase		TID xx09
1.21.5.7.1	Imaging Agent Administration Phase Identifier	DELAY_ESTIMATE_PHASE_1	TID xx09

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
1.21.5.7.2	Imaging Agent Administration Performed Phase UID	1.2.3.4.47110815.8	TID xx09  SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.5.7.3	Imaging Agent Administration Phase Type	(DCM,newcode061,"Automatic Administration Phase")	TID xx09 CID xx4  SINCE 1.21.5.3 IS "Automated Administration"
1.21.5.7.4	Imaging Agent Administration Syringe/Pump Phase Activity		TID xx04
1.21.5.7.4.1	Referenced Imaging Agent Identifier	INJECTOR_CONTRAST_AGENT	TID xx04 Value of 1.14.1
1.21.5.7.4.2	Volume Administered	10	TID xx04 UNITS = EV (ml, UCUM, "ml")  Same value as 1.21.5.7.5
1.21.5.7.4.3	Starting Flow Rate of administration	3	TID xx04 UNITS = EV (ml/s, UCUM "ml/s")
1.21.5.7.4.4	Peak Flow Rate in Phase Activity	3	TID xx04 UNITS = EV (ml/s, UCUM "ml/s")  SINCE 1.21.5.3 IS "Automated Administration" AND "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.5.7.4.5	Peak Pressure in Phase Activity	2	TID xx04 UNITS = EV (kPa, UCUM "kPa")  SINCE 1.21.5.3 IS "Automated Administration" AND "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.5.7.4.6	Initial Volume of Imaging Agent in Container	195	TID xx04 UNITS = EV (ml, UCUM, "ml")

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
			SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.5.7.4.7	Residual Volume of Imaging Agent in Container	185	TID xx04 UNITS = EV (ml, UCUM, "ml")  SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.5.7.4.8	DateTime Started	20181012121637	TID xx04  SINCE root Concept Name is "Performed Imaging Agent Administration"
1.21.5.7.4.9	Duration	3.3	TID xx04 UNITS = EV (s, UCUM, "s")  SINCE root Concept Name is "Performed Imaging Agent Administration"
1.21.5.7.5	Total Phase Volume Administered	10	TID xx09 UNITS = EV (ml, UCUM, "ml")  Same value as 1.21.5.7.4.2
1.21.5.7.6	DateTime Started	20181012121637	TID xx09  SINCE root Concept Name Code Sequence IS "Performed Imaging Agent Administration"
1.21.5.7.7	Duration	3.3	TID xx09 UNITS = EV (s, UCUM, "s")  SINCE root Concept Name Code Sequence IS

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
			"Performed Imaging Agent Administration")
1.21.5.8	Imaging Agent Administration Phase		TID xx09
1.21.5.8.1	Imaging Agent Administration Phase Identifier	DELAY_ESTIMATE_PHASE_2	TID xx09
1.21.5.8.2	Imaging Agent Administration Performed Phase UID	1.2.3.4.47110815.9	TID xx09  SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.5.8.3	Imaging Agent Administration Phase Type	(DCM,newcode061,"Automatic Administration Phase")	TID xx09 CID xx4  SINCE 1.21.5.3 IS "Automated Administration"
1.21.5.8.4	Imaging Agent Administration Syringe/Pump Phase Activity		TID xx04
1.21.5.8.4.1	Referenced Imaging Agent Identifier	INJECTOR_FLUSH_AGENT	TID xx04 Value of 1.15.1
1.21.5.8.4.2	Volume Administered	30	TID xx04 UNITS = EV (ml, UCUM, "ml")  Same value as 1.21.5.9.5
1.21.5.8.4.3	Starting Flow Rate of administration	3	TID xx04 UNITS = EV (ml/s, UCUM "ml/s")
1.21.5.8.4.4	Peak Flow Rate in Phase Activity	3	TID xx04 UNITS = EV (ml/s, UCUM "ml/s")  SINCE 1.21.5.3 IS "Automated Administration" AND "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.5.8.4.5	Peak Pressure in Phase Activity	5	TID xx04 UNITS = EV (kPa, UCUM "kPa")  SINCE 1.21.5.3 IS "Automated Administration" AND

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
			"Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.5.8.4.6	Initial Volume of Imaging Agent in Container	166	TID xx04 UNITS = EV (ml, UCUM, "ml")  SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.5.8.4.7	Residual Volume of Imaging Agent in Container	136	TID xx04 UNITS = EV (ml, UCUM, "ml")  SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.5.8.4.8	DateTime Started	20181012121640.3	TID xx04  SINCE root Concept Name is "Performed Imaging Agent Administration"
1.21.5.8.4.9	Duration	10	TID xx04 UNITS = EV (s, UCUM, "s")  SINCE root Concept Name is "Performed Imaging Agent Administration"
1.21.5.8.5	Total Phase Volume Administered	30	TID xx09 UNITS = EV (ml, UCUM, "ml")  Same value as 1.21.5.9.4.2
1.21.5.8.6	DateTime Started	20181012121640.3	TID xx09  SINCE root Concept Name Code Sequence IS "Performed Imaging Agent Administration"



Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
1.21.5.8.7	Duration	10	TID xx09 UNITS = EV (s, UCUM, "s")  SINCE root Concept Name Code Sequence IS "Performed Imaging Agent Administration")
1.21.5.9	Imaging Agent Administration Graph		TID xx20
1.21.5.9.1	Referenced Imaging Agent Identifier	INJECTOR_CONTRAST_AGENT	TID xx20
1.21.5.9.2	Flow Rate vs time		TID 3990 Concept name is parameter \$MeasurementGraph
1.21.5.9.2.1	X-Concept	(newcode577, DCM, "Time after the start of injection")	TID 3990 Parameter \$X-Concept
1.21.5.9.2.2	Y-Concept	(122094, DCM, "Rate of administration")	TID 3990 Parameter \$Y-Concept
1.21.5.9.2.3	Flow Rate vs time	IMAGE = 1.2.3.4.5.6.7.8.9.10	TID 3990
1.21.5.9.3	Pressure vs time		TID 3990 Concept name is parameter \$MeasurementGraph of TID 3990
1.21.5.9.3.1	X-Concept	(newcode577, DCM, "Time after the start of injection")	Parameter \$X-Concept of TID 3990
1.21.5.9.3.2	Y-Concept	(R0-010AC, SRT, "Pressure")	Parameter \$Y-Concept of TID 3990
1.21.5.9.3.3	Pressure vs time	IMAGE = 1.2.3.4.5.6.7.8.9.10	TID 3990  All graphs are in the same image in this example.
1.21.5.10	Imaging Agent Administration Graph		TID xx20
1.21.5.10.1	Referenced Imaging Agent Identifier	INJECTOR_FLUSH_AGENT	TID xx20
1.21.5.10.2	Flow Rate vs time		TID 3990 Concept name is parameter \$MeasurementGraph of TID 3990

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
1.21.5.10.2.1	X-Concept	(newcode577, DCM, "Time after the start of injection")	TID 3990 Parameter \$X-Concept
1.21.5.10.2.2	Y-Concept	(122094, DCM, "Rate of administration")	TID 3990 Parameter \$Y-Concept
1.21.5.10.2.3	Flow Rate vs time	IMAGE = 1.2.3.4.5.6.7.8.9.10	TID 3990
1.21.5.10.3	Pressure vs time		TID 3990 Concept name is parameter \$MeasurementGraph of TID 3990
1.21.5.10.3.1	X-Concept	(newcode577, DCM, "Time after the start of injection")	Parameter \$X-Concept of TID 3990
1.21.5.10.3.2	Y-Concept	(R0-010AC, SRT, "Pressure")	Parameter \$Y-Concept of TID 3990
1.21.5.10.3.3	Pressure vs time	IMAGE = 1.2.3.4.5.6.7.8.9.10	TID 3990
1.21.5.11	Number of Injector Heads	2	TID xx08
1.21.5.12	Programmable Device	(SRT,R-0038D,"Yes")	TID xx08 CID 231
1.21.6	Imaging Agent Administration Step		TID xx08
1.21.6.1	Imaging Agent Administration Step Identifier	DIAGNOSTIC_STEP_4	TID xx08
1.21.6.2	Imaging Agent Administration Performed Step UID	1.2.3.4.47110815.10	TID xx08  SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.6.3	Administration Mode	(DCM,newcode081,"Automated Administration")	TID xx08 CID xx8
1.21.6.4	Administration Step Type	(DCM,newcode1118,"Diagnostic Administration")	TID xx08 CID xx23
1.21.6.5	Scan Delay	12	TID xx08 UNITS = EV (s, UCUM, "s")
1.21.6.6	Pressure Limit	15	TID xx08 UNITS = EV (kPa, UCUM "kPa")  SINCE 1.21.6.3 IS "Automated Administration"
1.21.6.7	Route of Administration	(SRT,G-D101,Intravenous route")	TID xx08 CID 11

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
1.21.6.7.1	Site of	(SRT,G-D0C6,"Via arm vein")	TID xx08 CID 3746  SINCE "Route of Administration" IS "Intravenous route"
1.21.6.7.1.1	Laterality	(SRT,G-A101,"Left")	TID xx08 CID 244  SINCE "Site of" IS "Via arm vein"
1.21.6.8	Imaging Agent Administration Phase		TID xx09
1.21.6.8.1	Imaging Agent Administration Phase Identifier	DIAGNOSTIC_INJECTION_PHASE_1	TID xx09
1.21.6.8.2	Imaging Agent Administration Performed Phase UID	1.2.3.4.47110815.11	TID xx09  SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.6.8.3	Imaging Agent Administration Phase Type	(DCM,newcode061,"Automatic Administration Phase")	TID xx09 CID xx4  SINCE 1.21.6.3 IS "Automated Administration"
1.21.6.8.4	Imaging Agent Administration Syringe/Pump Phase Activity		TID xx04
1.21.6.8.4.1	Referenced Imaging Agent Identifier	INJECTOR_CONTRAST_AGENT	TID xx04 Value of 1.14.1
1.21.6.8.4.2	Volume Administered	88	TID xx04 UNITS = EV (ml, UCUM, "ml")  See 1.21.6.8.6 (Phase Volume) also
1.21.6.8.4.3	Starting Flow Rate of administration	1.5	TID xx04 UNITS = EV (ml/s, UCUM "ml/s")
1.21.6.8.4.4	Peak Flow Rate in Phase Activity	1.5	TID xx04 UNITS = EV (ml/s, UCUM "ml/s")  SINCE 1.21.6.3 IS "Automated Administration" AND "Root Concept Name Code Sequence" IS

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
			"Performed Imaging Agent Administration"
1.21.6.8.4.5	Peak Pressure in Phase Activity	5	TID xx04 UNITS = EV (kPa, UCUM "kPa")  SINCE 1.21.6.3 IS "Automated Administration" AND "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.6.8.4.6	Initial Volume of Imaging Agent in Container	185	TID xx04 UNITS = EV (ml, UCUM, "ml")  SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.6.8.4.7	Residual Volume of Imaging Agent in Container	97	TID xx04 UNITS = EV (ml, UCUM, "ml")  SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.6.8.4.8	DateTime Started	20181012121900	TID xx04  SINCE root Concept Name is "Performed Imaging Agent Administration"
1.21.6.8.4.9	Duration	58.6	TID xx04 UNITS = EV (s, UCUM, "s")  SINCE root Concept Name is "Performed Imaging Agent Administration"
1.21.6.8.5	Imaging Agent Administration Syringe/Pump Phase Activity		TID xx04
1.21.6.8.5.1	Referenced Imaging Agent Identifier	INJECTOR_FLUSH_AGENT	TID xx04 Value of 1.15.1
1.21.6.8.5.2	Volume Administered	88	TID xx04

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
			UNITS = EV (ml, UCUM, "ml")  See 1.21.6.8.6 (Phase Volume) also
1.21.6.8.5.3	Starting Flow Rate of administration	1.5	TID xx04 UNITS = EV (ml/s, UCUM "ml/s")
1.21.6.8.5.4	Peak Flow Rate in Phase Activity	1.5	TID xx04 UNITS = EV (ml/s, UCUM "ml/s")  SINCE 1.21.6.3 IS "Automated Administration" AND "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.6.8.5.5	Peak Pressure in Phase Activity	5	TID xx04 UNITS = EV (kPa, UCUM "kPa")  SINCE 1.21.6.3 IS "Automated Administration" AND "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.6.8.5.6	Initial Volume of Imaging Agent in Container	134	TID xx04 UNITS = EV (ml, UCUM, "ml")  Value results from 136ml – 2ml KVO within 1 min 10 sec until now  SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.6.8.5.7	Residual Volume of Imaging Agent in Container	46	TID xx04 UNITS = EV (ml, UCUM, "ml")  SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
1.21.6.8.5.8	DateTime Started	20181012121900	TID xx04  SINCE root Concept Name is "Performed Imaging Agent Administration"
1.21.6.8.5.9	Duration	58.6	TID xx04 UNITS = EV (s, UCUM, "s")  SINCE root Concept Name is "Performed Imaging Agent Administration"
1.21.6.8.6	Total Phase Volume Administered	176	TID xx09 UNITS = EV (ml, UCUM, "ml")  Sum of 1.21.6.8.4.2 and 1.21.6.8.5.2
1.21.6.8.7	DateTime Started	20181012121900	TID xx09  SINCE root Concept Name Code Sequence IS "Performed Imaging Agent Administration"
1.21.6.8.8	Duration	58.56	TID xx09 UNITS = EV (s, UCUM, "s")  SINCE root Concept Name Code Sequence IS "Performed Imaging Agent Administration")
1.21.6.9	Imaging Agent Administration Phase		TID xx09
1.21.6.9.1	Imaging Agent Administration Phase Identifier	DIAGNOSTIC_INJECTION_PHASE_2	TID xx09
1.21.6.9.2	Imaging Agent Administration Performed Phase UID	1.2.3.4.47110815.12	TID xx09  SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
1.21.6.9.3	Imaging Agent Administration Phase Type	(DCM,newcode061,"Automatic Administration Phase")	TID xx09 CID xx4  SINCE 1.21.6.3 IS "Automated Administration"
1.21.6.9.4	Imaging Agent Administration Syringe/Pump Phase Activity		TID xx04
1.21.6.9.4.1	Referenced Imaging Agent Identifier	INJECTOR_FLUSH_AGENT	TID xx04 Value of 1.15.1
1.21.6.9.4.2	Volume Administered	30	TID xx04 UNITS = EV (ml, UCUM, "ml")  Same value as 1.21.6.9.5
1.21.6.9.4.3	Starting Flow Rate of administration	3	TID xx04 UNITS = EV (ml/s, UCUM "ml/s")
1.21.6.9.4.4	Peak Flow Rate in Phase Activity	3	TID xx04 UNITS = EV (ml/s, UCUM "ml/s")  SINCE 1.21.6.3 IS "Automated Administration" AND "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.6.9.4.5	Peak Pressure in Phase Activity	5	TID xx04 UNITS = EV (kPa, UCUM "kPa")  SINCE 1.21.6.3 IS "Automated Administration" AND "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.6.9.4.6	Initial Volume of Imaging Agent in Container	46	TID xx04 UNITS = EV (ml, UCUM, "ml")  SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.6.9.4.7	Residual Volume of Imaging Agent in Container	16	TID xx04

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
			UNITS = EV (ml, UCUM, "ml")  SINCE "Root Concept Name Code Sequence" IS "Performed Imaging Agent Administration"
1.21.6.9.4.8	DateTime Started	20181012121958.56	TID xx04  SINCE root Concept Name is "Performed Imaging Agent Administration"
1.21.6.9.4.9	Duration	10	TID xx04 UNITS = EV (s, UCUM, "s")  SINCE root Concept Name is "Performed Imaging Agent Administration"
1.21.6.9.5	Total Phase Volume Administered	30	TID xx09 UNITS = EV (ml, UCUM, "ml")  Same value as 1.21.6.9.4.2
1.21.6.9.6	DateTime Started	20181012121958.56	TID xx09  SINCE root Concept Name Code Sequence IS "Performed Imaging Agent Administration"
1.21.6.9.7	Duration	10 s	TID xx09 UNITS = EV (s, UCUM, "s")  SINCE root Concept Name Code Sequence IS "Performed Imaging Agent Administration"
1.21.6.10	Imaging Agent Administration Graph		TID xx20
1.21.6.10.1	Referenced Imaging Agent Identifier	INJECTOR_CONTRAST_AGENT	TID xx20
1.21.6.10.2	Flow Rate vs time		TID 3990



Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
			Concept name is parameter \$MeasurementGraph
1.21.6.10.2.1	X-Concept	(newcode577, DCM, "Time after the start of injection")	TID 3990 Parameter \$X-Concept
1.21.6.10.2.2	Y-Concept	(122094, DCM, "Rate of administration")	TID 3990 Parameter \$Y-Concept
1.21.6.10.2.3	Flow Rate vs time	IMAGE = 1.2.3.4.5.6.7.8.9.11	TID 3990
1.21.6.10.3	Pressure vs time		TID 3990 Named by parameter \$MeasurementGraph
1.21.6.10.3.1	X-Concept	(newcode577, DCM, "Time after the start of injection")	TID 3990 Parameter \$X-Concept
1.21.6.10.3.2	Y-Concept	(R0-010AC, SRT, "Pressure")	TID 3990 Parameter \$Y-Concept
1.21.6.10.3.3	Pressure vs time	IMAGE = 1.2.3.4.5.6.7.8.9.11	TID 3990
1.21.6.11	Imaging Agent Administration Graph		TID xx20
1.21.6.11.1	Referenced Imaging Agent Identifier	INJECTOR_FLUSH_AGENT	TID xx20
1.21.6.11.2	Flow Rate vs time		TID 3990 Concept name is parameter \$MeasurementGraph
1.21.6.11.2.1	X-Concept	(newcode577, DCM, "Time after the start of injection")	TID 3990 Parameter
1.21.6.11.2.2	Y-Concept	(122094, DCM, "Rate of administration")	TID 3990 Parameter \$Y-Concept
1.21.6.11.2.3	Flow Rate vs time	IMAGE = 1.2.3.4.5.6.7.8.9.11	TID 3990
1.21.6.11.3	Pressure vs time		TID 3990 Named by parameter \$MeasurementGraph
1.21.6.11.3.1	X-Concept	(newcode577, DCM, "Time after the start of injection")	TID 3990 Parameter \$X-Concept
1.21.6.11.3.2	Y-Concept	(R0-010AC, SRT, "Pressure")	TID 3990 Parameter \$Y-Concept
1.21.6.11.3.3	Pressure vs time	IMAGE = 1.2.3.4.5.6.7.8.9.11	TID 3990
1.21.6.12	Number of Injector Heads	2	TID xx08
1.21.6.13	Programmable Device	(SRT,R-0038D,"Yes")	TID xx08 CID 231

Node	Code Meaning of Concept Name	Code Meaning or Example Value	Reference to TID / CID / ... Comments
1.22	Planned Imaging Agent Administration SOP Instance	1.2.3.4.47110815.13	TID xx10  SINCE this administration was based on a Imaging Administration Plan
1.23	Imaging Agent Administration Completion Status	(SRT,R-404F1, "Complete")	TID xx10 CID xx17
1.24	Imaging Agent Administration Adverse Events		TID xx11
1.24.1	Administration discontinued	(SRT,R-00339,"No")	TID xx11 CID 231
1.24.2	Adverse Event	(SRT,F-400A9,"Sweating")	TID xx11 CID xx1
1.24.2.1	Severity	(SRT,R-404FA,"Mild")	TID xx11 CID 3716
1.24.2.2	Relative Time	(SRT,R-40FB9,"Before Procedure")	TID xx11 CID xx2
1.24.2.3	Adverse Event Detection Date Time	20181012121500	TID xx11
1.24.2.4	Referenced Imaging Agent Administration Step UID	1.2.3.4.47110815.5	TID xx11 Same value as 1.21.4.2
1.24.2.5	Referenced Imaging Agent Administration Phase UID	1.2.3.4.47110815.6	TID xx11 Same value as 1.21.4.6.2
1.24.2.6	Comment	Patient was afraid of procedure	TID xx11
1.24.3	Adverse Event	(SRT,D0-B0330,"Injection Site Extravasation")	TID xx11 CID xx1
1.24.3.1	Relative Time	(SRT,R-422A4,"After Procedure")	TID xx11 CID xx2
1.24.3.2	Adverse Event Detection Date Time	20181012122100	TID xx11
1.24.3.3	Estimated Extravasation Volume	2	TID xx11 UNITS = EV (ml, UCUM, "ml")  SINCE 1.17.3 IS "Injection Site Extravasation"
1.24.3.4	Referenced Imaging Agent Administration Step UID	1.2.3.4.47110815.10	TID xx11 Same value as 1.21.6.2
1.24.3.5	Referenced Imaging Agent Administration Phase UID	1.2.3.4.47110815.12	TID xx11 Same value as 1.21.6.9.2
1.24.3.6	Comment	Detected extravasation when removing needle	TID xx11

<b>Node</b>	<b>Code Meaning of Concept Name</b>	<b>Code Meaning or Example Value</b>	<b>Reference to TID / CID / ... Comments</b>
1.25	Imaging Agent Administration Injector Events		TID xx19
1.25.1	Administration discontinued	(SRT,R-00339,"No")	TID xx19 CID 231
1.25.2	Imaging Agent Administration Injector Event Type	(DCM, newcode012,"Keep vein open started")	TID xx19 CID xx21
1.25.2.1	Injector Event Detection Date Time	20181012121628	TID xx19
1.25.2.2	Referenced Imaging Agent Identifier	INJECTOR_FLUSH_AGENT	TID xx19
1.25.3	Imaging Agent Administration Injector Event Type	(DCM, newcode013,"Keep vein open ended")	TID xx19 CID xx21
1.25.3.1	Injector Event Detection Date Time	201810121958	TID xx19
1.25.3.2	Referenced Imaging Agent Identifier	INJECTOR_FLUSH_AGENT	TID xx19
1.26	Total Keep Vein Open Volume Administered	3	TID xx10 UNITS = EV (ml, UCUM, "ml")