DICOM Correction Item

Correction Number CP-1047	
Log Summary: Dose Check support in DICOM CT Radiation Dose Report	
Type of Modification Addition	Name of Standard PS 3.16 2010

Rationale for Correction:

Regulatory agencies (e.g., U.S. FDA) are interested in CT equipment implementing an alert when the dose setting exceeds a diagnostic reference level for the scan protocol. (see FDA White Paper at http://www.fda.gov/downloads/Radiation-EmittingProducts/RadiationSafety/RadiationDoseReduction/UCM200087.pdf).

The MITA CT Section has developed an industry consensus position on Dose Check and its attributes. http://www.medicalimaging.org/2010/02/nation%E2%80%99s-ct-manufacturers-unveil-new-industry-wide-medical-radiation-patient-safety-features/

That position was formalized in the Computed Tomography Dose Check standard NEMA XR 25-2010. http://www.nema.org/stds/xr25.cfm

It would be useful to record this information, such as alert threshold, in the Radiation Dose Report, as well as the reason for any override of that threshold.

Sections of documents affected

PS 3.16 Annex A and D

Correction Wording:

Add the following reference to Section 2 in Part 16

2 Normative references

The following standards contain provisions that, through reference in this text, constitute provisions of this Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibilities of applying the most recent editions of the standards indicated below.

UCUM Unified Code for Units of Measure, Regenstrief Institute for Health Care, Indianapolis 2000.

LOINC® Logical Observation Identifier Names and Codes, Regenstrief Institute for Health Care, Indianapolis 2000.

…

NEMA XR 25-2010 Computed Tomography Dose Check Standard, National Electrical Manufacturers Association, Rosslyn, Virginia 2010. http://www.nema.org/stds/xr25.cfm

Add the following TID in Annex A in Part 16

TID 10015 CT Dose Check Details

This template records details related to the use of the NEMA Dose Check Standard (NEMA XR-25-2010).

TID 10015
CT DOSE CHECK DETAILS
Type: Extensible

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (113900, DCM, “Dose Check Alert Details”)	1	MC	IF the scanning device has implemented dose alerts	
2	>	CONTAINS	CODE	EV (113901, DCM, “DLP Alert Value Configured”)	1	M		DCID (230) Yes-No
3	>	CONTAINS	CODE	EV (113902, DCM, “CTDIvol Alert Value Configured”)	1	M		DCID (230) Yes-No
4	>	CONTAINS	NUM	EV (113903, DCM, “DLP Alert Value”)	1	MC	IFF value of Row 2 is (R-0038D,SRT, “Yes”)	Units = EV (mGy.cm, UCUM, “mGy.cm”)
5	>	CONTAINS	NUM	EV (113904, DCM, “CTDIvol Alert Value”)	1	MC	IFF value of Row 3 is (R-0038D,SRT, “Yes”)	Units = EV (mGy, UCUM, “mGy”)
6	>	CONTAINS	NUM	EV(113905, DCM, “Accumulated DLP Forward Estimate”)	1	MC	IF Accumulated DLP Forward Estimate (Row 6) exceeds DLP Alert Value (Row 4)	Units = EV (mGy.cm, UCUM, “mGy.cm”)
7	>	CONTAINS	NUM	EV (113906, DCM, “Accumulated CTDIvol Forward Estimate”)	1	MC	IF Accumulated CTDIvol Forward Estimate (Row 7) exceeds CTDIvol Alert Value (Row 5)	Units = EV (mGy, UCUM, “mGy”)
8	>	CONTAINS	TEXT	EV (113907, DCM, “Reason for Proceeding”)	1	UC	IFF Accumulated DLP Forward Estimate (Row 6) exceeds DLP Alert Value (Row 4) or Accumulated CTDIvol Forward Estimate (Row 7) exceeds CTDIvol Alert Value (Row 5)	
9	>	CONTAINS	INCLUDE	DTID (1020) Person Participant	1	MC	IF Accumulated DLP Forward Estimate (Row 6) exceeds DLP Alert Value (Row 4) or Accumulated CTDIvol Forward Estimate (Row 7) exceeds CTDIvol Alert Value (Row 5)	$PersonProcedureRole = EV (113850, DCM, “Irradiation Authorizing”)
10			CONTAINER	EV (113908, DCM, “Dose Check Notification Details”)	1	MC	IF the scanning device has implemented dose notifications	
11	>	CONTAINS	CODE	EV (113909, DCM, “DLP Notification Value Configured”)	1	M		DCID (230) Yes-No
12	>	CONTAINS	CODE	EV (113910, DCM, “CTDIvol Notification Value Configured”)	1	M		DCID (230) Yes-No
13	>	CONTAINS	NUM	EV (113911, DCM, “DLP Notification Value”)	1	MC	IFF value of Row 11 is (R-0038D,SRT, “Yes”)	Units = EV (mGy.cm, UCUM, “mGy.cm”)
14	>	CONTAINS	NUM	EV (113912, DCM, “CTDIvol Notification Value”)	1	MC	IFF value of Row 12 is (R-0038D,SRT, “Yes”)	Units = EV (mGy, UCUM, “mGy”)

15	>	CONTAINS	NUM	EV (113913, DCM, “DLP Forward Estimate”)	1	MC	IF DLP Forward Estimate (Row 15) exceeds DLP Notification Value (Row 13)	Units = EV (mGy.cm, UCUM, “mGy.cm”)
16	>	CONTAINS	NUM	EV (113914, DCM, “CTDIvol Forward Estimate”)	1	MC	IF CTDIvol Forward Estimate (Row 16) exceeds CTDIvol Notification Value (Row 14)	Units = EV (mGy, UCUM, “mGy”)
17	>	CONTAINS	TEXT	EV (113907, DCM, “Reason for Proceeding”)	1	UC	IFF DLP Forward Estimate (Row 15) exceeds DLP Notification Value (Row 13) or CTDIvol Forward Estimate (Row 16) exceeds CTDIvol Notification Value (Row 14)	
18	>	CONTAINS	INCLUDE	DTID (1020) Person Participant	1	UC	IFF DLP Forward Estimate (Row 15) exceeds DLP Notification Value (Row 13) or CTDIvol Forward Estimate (Row 16) exceeds CTDIvol Notification Value (Row 14)	$PersonProcedureRole = EV (113850, DCM, “Irradiation Authorizing”)

Content Item Descriptions

Row 1	Container for Dose Check Alert details.
Row 2	Indicates whether a DLP Alert Value was configured (e.g. by the institution) for the exam to which this irradiation event belongs.
Row 3	Indicates whether a CTDIvol Alert Value was configured (e.g. by the institution) for the exam to which this irradiation event belongs.
Row 4	The configured value applicable to the current exam which would trigger an alert if the accumulated DLP were projected to exceed it.
Row 5	The configured value applicable to the current exam which would trigger an alert if the Accumulated CTDIvol at any given location were projected to exceed it.
Row 6	The value estimated prior to performing this irradiation event of the projected DLP accumulated during this exam, including this irradiation event. The estimate may include assumptions such as those described in NEMA XR 25-2010.
Row 7	The value estimated prior to performing this irradiation event of the projected CTDIvol accumulated during this exam, including this irradiation event. The value is for the location with the highest estimated accumulation. The actual location is not recorded. The estimate may include assumptions such as those described in NEMA XR 25-2010.
Row 8	The reason provided by the operator for proceeding with an irradiation event projected to exceed an alert value.
Row 9	Person responsible for authorizing irradiation projected to exceed an alert value.
Row 10	Container for Dose Check Notification details.
Row 11	Indicates whether a DLP Notification Value was configured (e.g. by the institution) for the Protocol Element Group to which this irradiation event corresponds.
Row 12	Indicates whether a CTDIvol Notification Value was configured (e.g. by the institution) for the Protocol Element Group to which this irradiation event corresponds.
Row 13	The configured value applicable to the current irradiation event which would trigger a notification if the DLP were projected to exceed it.
Row 14	The configured value applicable to the current irradiation event which would trigger a notification if the CTDIvol were projected to exceed it.
Row 15	The value estimated prior to performing this irradiation event of the DLP for this irradiation event. The estimate may include assumptions such as those described in NEMA XR 25-2010.
Row 16	The value estimated prior to performing this irradiation event of the CTDIvol for this irradiation event. The value is for the location with the highest estimated value. The actual location is not recorded. The estimate may include assumptions such as those described in NEMA XR 25-2010.
Row 17	The reason provided by the operator for proceeding with an irradiation event projected to exceed a notification value.
Row 18	Person responsible for authorizing irradiation projected to exceed a notification value.

Modify TID 10013 in Annex A in Part 16 to INCLUDE the new TID

TID 10013
CT IRRADIATION EVENT DATA
Type: Extensible

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (113819, DCM, "CT Acquisition")	1	M		
		…						
21	>	CONTAINS	CONTAINER	EV (113829, DCM, "CT Dose")	1	MC	IF row 4 does not equal (113805, DCM, "Constant Angle Acquisition")	
22	>>	CONTAINS	NUM	EV (113830, DCM, "Mean CTDIvol ")	1	M		Units = EV (mGy, UCUM, "mGy")
23	>>	CONTAINS	CODE	EV (113835, DCM, "CTDIw Phantom Type")	1	M		DCID (4052) Phantom Devices
24	>>	CONTAINS	NUM	EV (113836, DCM, "CTDIfreeair Calculation Factor")	1	U		Units = EV (mGy/mAs, UCUM, "mGy/mAs")
25	>>	CONTAINS	NUM	EV (113837, DCM, "Mean CTDIfreeair")	1	U		Units = EV (mGy, UCUM, "mGy")
26	>>	CONTAINS	NUM	EV (113838, DCM, "DLP")	1	M		Units = EV (mGycm, UCUM, "mGycm")
27	>>	CONTAINS	NUM	EV (113839, DCM, "Effective Dose")	1	U		Units = EV (mSv, UCUM, "mSv")
28	>>>	HAS CONCEPT MOD	CODE	EV (G-C036, SRT, "Measurement Method")	1	MC	IF row 27 is present	DCID (10011) "Effective Dose Evaluation Method")
29	>>>>	HAS PROPERTIES	NUM	EV (113840, DCM, "Effective Dose Conversion Factor")	1	MC	IF row 28 is present and equals (113800, DCM, "DLP to E conversion via MC computation") or equals (113802, DCM, "DLP to E conversion via measurement")	Units = EV (mSv/mGycm, UCUM, "mSv/mGycm")
30	**>>**	**CONTAINS**	**INCLUDE**	**DTID (100XX) CT Dose Check Details**	**1**	**M**		
~~30~~ **31**	>	CONTAINS	TEXT	EV (113842, DCM, "X-ray Modulation Type")	1	U		
~~31~~ **32**	>	CONTAINS	TEXT	EV (121106, DCM, "Comment")	1	U		
~~32~~ **33**	>	CONTAINS	INCLUDE	DTID (1020) Person Participant	1-n	U		$PersonProcedureRole = EV (113851, DCM, "Irradiation Administering")
~~33~~ **34**	>	CONTAINS	INCLUDE	DTID (1021) Device Participant	1	M		$DeviceProcedureRole = EV (113859, DCM, "Irradiating Device")

Content Item Descriptions

	…
Row 14	CT X-ray source parameters related to the acquisition. For each X-ray source an item must be present. **For multi-energy acquisitions, multiple items may be present for each X-ray source, each item describing one energy level.**
	…

Row 30	**Record of details associated with using the NEMA Dose Check Standard (NEMA XR-25-2010).**
Row ~~30~~ **31**	The type of exposure modulation. May use the value of Exposure Modulation Type (0018,9323) from CT Exposure Macro or from CT Image Module.
Row ~~32~~ **33**	People responsible for the administration of the radiation reported in the irradiation event. May include values which would appear in Performing Physicians' Name (0008,1050), Performing Physician Identification Sequence (0008,1052), Operators' Name (0008,1070) and/or Operator Identification Sequence (0008,1072).
Row ~~33~~ **34**	The device which produced the irradiation in this Irradiation Event. I.e. the CT scanner.

Modify PS 3.16 Annex D

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

Code Value	Code Meaning	Definition	Notes
…	…	…	…
113900	**Dose Check Alert Details**	**Report section about cumulative dose alerts during an examination.**	
113901	**DLP Alert Value Configured**	**Flag denoting whether a DLP Alert Value was configured.**	
113902	**CTDIvol Alert Value Configured**	**Flag denoting whether a CTDIvol Alert Value was configured.**	
113903	**DLP Alert Value**	**Cumulative Dose Length Product value configured to trigger an alert. See NEMA XR 25-2010 Dose Check Standard.**	
113904	**CTDIvol Alert Value**	**Cumulative CTDIvol value configured to trigger an alert. See NEMA XR 25-2010 Dose Check Standard.**	
113905	**Accumulated DLP Forward Estimate**	**A forward estimate of the accumulated DLP plus the estimated DLP for the next Protocol Element Group. See NEMA XR 25-2010 Dose Check Standard.**	
113906	**Accumulated CTDIvol Forward Estimate**	**A forward estimate at a given location of the accumulated CTDIvol plus the estimated CTDIvol for the next Protocol Element Group. See NEMA XR 25-2010 Dose Check Standard.**	
113907	**Reason for Proceeding**	**Reason provided for proceeding with a procedure that is projected to exceed a configured dose value.**	
113908	**Dose Check Notification Details**	**Report section about dose notifications during a protocol element.**	
113909	**DLP Notification Value Configured**	**Flag denoting whether a DLP Notification Value was configured.**	
113910	**CTDIvol Notification Value Configured**	**Flag denoting whether a CTDIvol Notification Value was configured.**	
113911	**DLP Notification Value**	**Dose Length Product value configured to trigger a notification for a given protocol element.**	
113912	**CTDIvol Notification Value**	**CTDIvol value configured to trigger a notification for a given protocol element.**	

113913	**DLP Forward Estimate**	**A forward estimate of the DLP for the next Protocol Element Group. See NEMA XR 25-2010 Dose Check Standard.**	
113914	**CTDIvol Forward Estimate**	**A forward estimate of the CTDIvol for the next Protocol Element Group. See NEMA XR 25-2010 Dose Check Standard.**	