DICOM Correction Item

Correction Number CP-554	
Log Summary: Isocenter position for RT Images	
Type of Modification Addition	Name of Standard PS 3 2004
Rationale for Correction: Image guided patient position verification and treatment imaging in radiotherapy are performed in a wide variety of procedures today. KV imaging and cone-beam CT used in different contexts (or generally IGRT) are examples of this. Cone-beam-CT as well as orthogonal imaging using kV and/or MV beams, generate a set of images in 3D space, often acquired at different isocenter positions. These images have a defined spatial relation to each other. These images are often matched against reference images from 3D planning, positioned in the planning CT frame of reference. Planning CT images can be matched against cone-beam CT images. RT images (from both cone-beam CTs or kV/MV acquisition) can be matched against reference RT images. Each of those procedures require a proper definition of the geometric 3D relation between the involved images and, for image matching, a definition of the relationship between frames of reference. Today, the latter can be transferred and stored with the new spatial registration object introduced in DICOM Version 2004, relating frames of reference to each other. While other images have a well-defined position in a frame of reference, RT images do not. However, orthogonal sets of RT images for example, which are taken at treatment time, share a frame of reference. Furthermore, cone-beam CT images with a well-defined frame of reference can be related to RT images, by creating DRRs from cone-beam CTs and matching MV or kV images against those. In addition RT images taken at treatment time can be matched against reference images on-line. The corresponding matches can be transferred using a Spatial Registration object. In all these cases, we are dealing with the frames of reference at treatment time. While the FOR module is foreseen in the RT image, there is no possibility to describe the isocenter position of the RT image in this FOR. Therefore, an isocenter position definition, in the same way as defined for RT Beams and for CT images, should be possible in the RT Image. Because the RT Series has no Patient Position (0018,5100) defined (which facilitates the mapping of the IEC System axis to the DICOM Patient axis), the Patient Position is added as well.	
Sections of documents affected PS 3.3 C 8.8.2 (RT Image Module)	
Correction Wording:	

In PS 3.3, Section C.8.8.2 (RT Image Module), Table C.8-34, add the following attribute after Table Top Lateral Position (300A,012A):

Attribute Name	Tag	Type	Attribute Description
Isocenter Position	**(300A,012C)**	**3**	**Isocenter coordinates (x,y,z), in mm. Specifies the location of the machine isocenter in the patient-based coordinate system associated with the Frame of Reference. It allows transformation from the equipment-based IEC coordinate system to the patient-based coordinate system.**

Attribute Name	Tag	Type	Attribute Description
Patient Position	**(0018,5100)**	**1C**	**Patient position descriptor relative to the patient support device.** **Required if Isocenter Position (300A,012C) is present. May be present otherwise.** **See Section C.7.3.1.1.2 for Defined Terms and further explanation.** **Note:** **The orientation of the patient relative to the patient support device is denoted in the same manner as in the RT Patient Setup module. It defines the relation of the patient-based DICOM coordinate system identified by the frame of reference module of the RT Image to the IEC coordinate system and together with the Isocenter Position (300A,012C) allows the RT Image to be placed into the patient frame of reference. It also allows a system using an RT Image to verify that the patient is setup in a similar position relative to the patient support device.**