

## DICOM Correction Proposal

STATUS	Final Text
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Correction Number	CP-1574
Log Summary:	Streamline Number of Control Points Conditions
Name of Standard	PS3.3 2016c
Rationale for Correction:	<p>The specification of the number of Items in Control Point Sequences versus the attributes declaring the Number of Control Points is not aligned amongst the involved attributes. The dependencies are unnecessarily loose and even wrong in some cases.</p> <p>The CP binds the number of items in Control Point Sequences to the corresponding attributes specifying this number.</p> <p>Base on this change, the semantics of the requirements on number of items are located in only one place after that change.</p> <p>The issue was observed first in Brachytherapy modules, and then observed in RT Beams modules as well. The Ion Therapy modules have that approach applied already.</p> <p>This approach is consistent with various other usages of 'Number of' attributes related to sequences.</p>
Correction Wording:	

### C.8.8.14 RT Beams Module

The RT Beams Module contains information defining equipment parameters for delivery of external radiation beams.

**Table C.8-50. RT Beams Module Attributes**

Attribute Name	Tag	Type	Attribute Description
Beam Sequence	(300A,00B0)	1	Sequence of treatment beams for current RT Plan. One or more Items shall be included in this Sequence.
>Beam Number	(300A,00C0)	1	Identification number of the Beam. The value of Beam Number (300A,00C0) shall be unique within the RT Plan in which it is created. See Note 1.
...			
>Number of Control Points	(300A,0110)	1	Number of control points in Beam. <b>Value shall be greater than or equal to 2.</b>
>Control Point Sequence	(300A,0111)	1	Sequence of machine configurations describing treatment beam. <b>Two or more Items shall be included in this</b>

Attribute Name	Tag	Type	Attribute Description
			<b>Sequence. The number of Items in this Sequence shall equal the value of Number of Control Points (300A,0110).</b> See Section C.8.8.14.5 and Section C.8.8.14.6.
>>Control Point Index	(300A,0112)	1	Index of current Control Point, starting at 0 for first Control Point.
...			

*In Part 3, change the following in section C.8.8.21 RT Beams Session Record Module*

## C.8.8.21 RT Beams Session Record Module

**Table C.8-57. RT Beams Session Record Module Attributes**

Attribute Name	Tag	Type	Attribute Description
Referenced Fraction Group Number	(300C,0022)	3	Identifier of Fraction Group within referenced RT Plan.
....			
Treatment Session Beam Sequence	(3008,0020)	1	Sequence of Beams administered during treatment session. One or more Items shall be included in this Sequence.
>Referenced Beam Number	(300C,0006)	3	References Beam specified by Beam Number (300A,00C0) in Beam Sequence (300A,00B0) in RT Beams Module within referenced RT Plan.
>Number of Control Points	(300A,0110)	1	Number of control points delivered. <b>Value shall be greater than or equal to 2.</b>
>Control Point Delivery Sequence	(3008,0040)	1	Sequence of beam control points for current treatment beam. <del>One or more Items shall be included in this Sequence.</del> <b>The number of Items in this Sequence shall equal the value of Number of Control Points (300A,0110).</b> See Section C.8.8.21.1.
>>Referenced Control Point Index	(300C,00F0)	3	Uniquely identifies Control Point specified by Control Point Index (300A,0112) within Beam referenced by Referenced Beam Number (300C,0006).
...			

*In Part 3, change the following in section C.8.8.15 RT Brachy Application Setups Module*

## C.8.8.15 RT Brachy Application Setups Module

The RT Brachy Application Setups Module describes the application of a brachytherapy radiotherapy treatment. It contains one or more sources, each associated with one or more Channels. A Channel is a device by which a source is placed in its intended treatment position or positions. A Channel may consist of a Source Applicator plus a Transfer

Tube, a Source Applicator alone, a rigid or flexible linear source, or a seed. A number of Channels (for example applicators, sources or seeds) are generally arranged in an Application Setup, which may be considered a "logical" device. It is important not to confuse Application Setup with Applicator. The model used here has been primarily built around the concept of remote afterloading, but extended to support other brachytherapy applications such as manual applicators and molds, seeds, and sources. Additional devices that are not Channels are described as Brachy Accessory Devices. Examples of Accessory Devices include shields that modify the dose distribution from all sources in the treatment. However, Channel shields modify the dose only for the source(s) in that Channel.

The data in the module are arranged as follows:

Treatment Machine Sequence	<i>;treatment machine information (single item)</i>
Source Sequence	<i>;library of sources used in brachy application</i>
Application Setup Sequence	<i>;one or more applicators, sources, seeds etc</i>
>Brachy Accessory Device Sequence	<i>;application level shields etc</i>
>Channel Sequence	<i>;applicator, line source(s), seed(s) etc</i>
>>Channel Shield Sequence	<i>;channel-specific shields</i>
>>Brachy Control Point Sequence	<i>;mechanism to support individual source dwell times</i>

**Table C.8-51. RT Brachy Application Setups Module Attributes**

Attribute Name	Tag	Type	Attribute Description
Brachy Treatment Technique	(300A,0200)	1	Type of brachytherapy treatment technique. Enumerated Values: INTRALUMENARY INTRACAVITARY INTERSTITIAL CONTACT INTRAVASCULAR PERMANENT  See Section C.8.8.15.1.
Brachy Treatment Type	(300A,0202)	1	Type of brachytherapy treatment. Defined Terms: MANUAL       manually positioned HDR    High dose rate MDR    Medium dose rate LDR    Low dose rate PDR    Pulsed dose rate
...			
>Channel Sequence	(300A,0280)	1	Sequence of Channels for current Application Setup. One or more Items shall be included in this Sequence.
>>Channel Number	(300A,0282)	1	Identification number of the Channel. The value of Channel Number (300A,0282) shall be unique within the Application Setup in which it is created.
>>Number of Control Points	(300A,0110)	1	Number of control points in Channel. For an N-segment Channel there will be 2N (stepwise movement) or N+1 (continuous movement) control

Attribute Name	Tag	Type	Attribute Description
			points.
>>Final Cumulative Time Weight	(300A,02C8)	1C	Value of Cumulative Time Weight (300A,02D6) for final Control Point in Brachy Control Point Sequence (300A,02D0). Required if Cumulative Time Weight (300A,02D6) is non-null in Control Points specified within Brachy Control Point Sequence (300A,02D0). See Section C.8.8.15.6.
>>Brachy Control Point Sequence	(300A,02D0)	1	Sequence of machine configurations describing this Channel. <b><u>Two or more Items shall be included in this Sequence. The number of Items in this Sequence shall equal the value of Number of Control Points (300A,0110).</u></b> See Section C.8.8.15.7.
>>>Control Point Index	(300A,0112)	1	Index of current Control Point, starting at 0 for first Control Point.
>>>Cumulative Time Weight	(300A,02D6)	2	Cumulative time weight to current Control Point (where the weighting is proportional to time values delivered). Cumulative Time Weight for first item in Brachy Control Point Sequence (300A,02D0) is always zero. See Section C.8.8.15.6 and Section C.8.8.15.8.
>>>Control Point Relative Position	(300A,02D2)	1	Distance between current Control Point Position and the distal-most possible Source position in current Channel (mm). See Section C.8.8.15.9.
>>>Control Point 3D Position	(300A,02D4)	3	Coordinates (x, y, z) of Control Point in the patient based coordinate system described in Section C.7.6.2.1.1 (mm). See Section C.8.8.15.10.
>>>Control Point Orientation	(300A,0412)	3	(x,y,z) component of the direction vector of the brachy source or seed at the Control Point 3D Position (300A,02D4). See Section C.8.8.15.14.

*In Part 3, change the following in section C.8.8.22 RT Brachy Session Record Module*

### C.8.8.22 RT Brachy Session Record Module

**Table C.8-58. RT Brachy Session Record Module Attributes**

Attribute Name	Tag	Type	Attribute Description
Referenced Fraction Group Number	(300C,0022)	3	Identifier of Fraction Group within referenced RT Plan.
...			
Treatment Session Application Setup Sequence	(3008,0110)	1	Sequence of Application Setups for RT Treatment Record for current RT Plan. One or more Items shall be included in this Sequence.
...			
>Recorded Channel Sequence	(3008,0130)	1	Sequence of Channels for current Application Setup.

Attribute Name	Tag	Type	Attribute Description
			One or more Items shall be included in this Sequence.
>>Channel Number	(300A,0282)	1	Identification number of the Channel. The value of Channel Number (300A,0282) shall be unique within the Application Setup in which it is created.
...			
>>Number of Control Points	(300A,0110)	1	Number of control points in Channel. For an N-segment Channel there will be 2N (stepwise movement) or N+1 (continuous movement) control points.
>>Brachy Control Point Delivered Sequence	(3008,0160)	1	Sequence of machine configurations describing this Channel. <b><u>Two or more Items shall be included in this Sequence. The number of Items in this Sequence shall equal the value of Number of Control Points (300A,0110).</u></b> See RT Plan IOD and Section C.8.8.22.1 for description of Brachy Control Point Delivered Sequence.
>>>Referenced Control Point Index	(300C,00F0)	3	Index of current Control Point, starting at 0 for first Control Point.
...			