Higher-Level Radiation Oncology Treatment Events derived from Lower-Level CPT Codes

♁ PRESENTER: Michael Gurley[1],
Asieh Golozar[1], Rimma Belenkaya[1],
Tatyana Sandler[1]
1 OHDSI Oncology Workgroup

INTRO:

CPT codes are a common structured source of patient data for radiation oncology treatment. In OMOP, a radiation oncology treatment can be comprised of 72 lower-level clinical patient entries in the PROCEDURE_OCCURRENCE table across 11 CPT codes. Through an aggregation to a higher-level event that is one record in the EPISODE table, several use cases can be addressed such as, more intuitive treatment representation to an oncology professional and data more amenable to analytics. For the representation of higher-level events, the level of granularity of modality and technique recommended by the American Society for Radiation Oncology (ASTRO) in the minimum data elements for radiation oncology consensus paper was assessed against what can be derived and aggregated from CPT codes.

METHODS

1. Curate relevant CPT codes
2. Reconcile past efforts of modality and techniques assignments to the lower-level CPT codes[2,3,4].
3. Identified ASTRO's minimum relevant defined data standards for modality and technique of a radiation oncology treatment[5].
4. Assessed CPT codes assignments of higher-level treatment in step 2 against the modalities and techniques defined by ASTRO in step 3 to determine extent of coverage using CPT codes.

RESULTS

Overall, the results show that CPT codes support a small subset of modalities and techniques represented in ASTRO's data elements. For a larger set, there are varying levels of details.

To use ASTRO's data elements for higher-level event representation, expanding the value sets of modality and technique to cover use cases with less information available about a treatment event. For example, when there is a CPT code for an "external beam radiotherapy" without additional details, addition of a higher-level event to capture "external beam radiotherapy" is needed.

There are **challenges** in **deriving** higher-level **Radiation Oncology** treatment **Events** from **CPT codes** with the level of **detail recommended** by **ASTRO**.

Radiation oncology procedure	Derivable from CPT		
	Yes	Partial	No
Modality			
External beam radiation therapy (EBRT)			
Protons	X		
Electrons			X
Photons (LINAC)		X	
Photons (isotope source)		X	
Neutrons	X		
Carbon			X
Brachytherapy			
Low dose rate	X		
High dose rate	X		
Pulse dose rate			X
Radiopharmaceuticals	X		
Electronic brachytherapy	X		
kV x-rays			
Intraoperative radiation therapy			X
Superficial		X	
Orthovoltage		X	
Technique			
Passive scattering			X
Scanning beam intensity modulated proton therapy			X
Scanning beam multi-field optimization			X
Scanning beam single-field optimization			X
2-dimensional (2D)			X
Intraoperative radiation therapy	X		
3-dimensional (3D)	X		
Intensity modulated radiation therapy (IMRT)	X		
Intracranial stereotactic	X		
Interstitial permanent		X	
Interstitial temporary		X	
Intracavitary permanent		X	
Intracavitary temporary		X	
Sealed			X
Unsealed			X
Intracavitary	X		

References/Citations

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