Conventions for Tobacco Handling in OMOP CDM V5.0
to Support PCORnet Requirements

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General Conventions

1. Concept IDs are taken from OMOP vocabularies v5 or later using the complete ("restricted") version that includes licensed terminologies such as CPT and others.

2. PCORnet CDM V1.0 requires data elements that are not currently part of the OMOP standard vocabulary. To represent PCORnet concepts that are not represented in the standard OMOP vocabulary, we will be using non-standard concepts from vocabulary_id = 'PCORnet' (former vocabulary_id = 60). While this violates the OMOP conventions to use only concept_ids from standard vocabularies, this CDRN-specific convention enables a uniform ETL from OMOP CDM to PCORnet CDM.

3. Representation of "Unknown" flavors.
   To support PCORnet conventions for representation of "Unknown" flavors, we will follow these conventions:

Null Name	Definition of each field
A data field is not present in the source system	A corresponding field in the OMOP CDM will be populated with concept_ID=0. A corresponding record in the OBSERVATION table will not be created.
A data field is present in the source system, but the source value is null or blank	A corresponding field in the OMOP CDM will be populated with "No Information" (44814650) from vocabulary_id = 'PCORNet'
A data field is present in the source system, but the source value explicitly denotes an unknown value	A corresponding field in the OMOP CDM will be populated with "Unknown"(44814653) from vocabulary_id = 'PCORNet'
A data field is present in the source system, but the source value cannot be mapped to the CDM	A corresponding field in the OMOP CDM will be populated with "Other" (44814649) from vocabulary_id = 'PCORNet'

Note, that PCORnet "Unknown" concepts in this document are displayed in grey.

Tobacco handling

The following aspects of Tobacco consumptions are captured in EHR: current and former smoking status, duration, frequency, amount (quantitative and qualitative) of tobacco smoking, and type of tobacco.

To support PCORnet requirements for tobacco representation, we propose to create connected Observation records: one capturing tobacco behavior and the other tobacco type. These two records should be linked in the FACT_RELATIONSHIP table. For each pair, there should be two records in the FACT_RELATIONSHIP table. The first record will contain: domain_concept_id_1 and domain_concept_id_2 equal to 27 ('Observation'), Fact_id_1 and Fact_id_2 equal to the respective observation_id of tobacco behavior and tobacco type records in the Observation table, and relationship_concept_id equal to TBD. The second record will contain: domain_concept_id_1 and domain_concept_id_2 equal to 27 ('Observation'), Fact_id_1 and Fact_id_2 equal to the respective observation_id of tobacco type and tobacco behavior records in the Observation table, and relationship_concept_id equal to TBD. Some tobacco behavior records may not have a corresponding tobacco type record as shown in Table 2.

The first Observation record in the tobacco behavior-type pair is represented by *Observation.observation_concept_id* 4275495 ('Tobacco smoking behavior - finding'). Permissible values of *Observation.value_as_concept_id* characterize mutually exclusive tobacco smoking

behaviors including: current and former smoking status, frequency, and daily consumption, as described in Table 1 below. There should be only one record for tobacco behavior at a given time point.

Table 1. Permissible values of *Observation.value_as_concept_id* for tobacco smoking behavior

Concept Name	Concept Id	SNOMED Concept Code	Status	Frequency	Daily consumption
Moderate smoker (20 or less per day)	4209585	56578002	Current smoker	Daily	Moderate smoker (20 or less per day)
Heavy smoker (over 20 per day)	4209006	56771006	Current smoker	Daily	Heavy smoker (over 20 per day)
Smokes tobacco daily	42709996	449868002[MU]	Current smoker	Daily	Unknown
Occasional tobacco smoker	Does not exist	428041000124106 [MU]	Current smoker	Some day	N/A
Smoker	4298794	77176002 [MU]	Current smoker	Unknown	Unknown
Never smoked tobacco	4144272	266919005 [MU]	Never smoker	N/A	N/A
Non-smoker	4222303	8392000	Current non-smoker, former status unknown	N/A	N/A
Ex-smoker	4310250	8517006 [MU]	Former smoker	Unknown	Unknown
Unknown	44814653	PCORnet concept	Unknown	N/A	N/A
No Information	44814650	PCORnet concept	Unknown	N/A	N/A
Other	44814649	PCORnet concept	Status cannot be mapped to any concepts above	N/A	N/A

MU in Table 1 indicates concepts used in Meaningful Use Core Measures (https://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/downloads/9_Record_Smoking_Status.pdf) . Concepts 'Smoker' (SNOMED 77176002) in this table and Meaningful Use Core Measures does not seem to have the same meaning.

The second record in the connected behavior-type pair is represented by *Observation.observation_concept_id* 4298794 ('Smoker'). Permissible values of *Observation.value_as_concept_id* are given in Table 2. Tobacco type record may exist only if tobacco current or past smoking status is positive. There should not be any tobacco type records if tobacco status is negative or unknown. Permissible combinations of tobacco behavior and tobacco type concepts are given in the table below. There may be one or more Observation records describing tobacco type for a given time point.

Table 2. Permissible values of *Observation.value_as_concept_id* for tobacco type

Concept Name	Concept Id	SNOMED Concept Code	Permissible tobacco status concepts	Permissible tobacco type concepts
Cigarette smoker	4276526	65568007	Moderate smoker (20 or less per day): 4209585 Heavy smoker (over 20 per day): 4209006 Chain smoker: 4044778 Smokes tobacco daily: 42709996 Occasional tobacco smoker: TBD Smoker: 4298794	Cigar smoker: 4246415 Pipe smoker: 4218917
Cigar smoker	4246415	59978006	Moderate smoker (20 or less per day): 4209585 Heavy smoker (over 20 per day): 4209006 Chain smoker: 4044778 Smokes tobacco daily: 42709996 Occasional tobacco smoker: TBD Smoker: 4298794	Cigarette smoker: 4276526 Pipe smoker: 4218917
Pipe smoker	4218917	82302008	Moderate smoker (20 or less per day): 4209585 Heavy smoker (over 20 per day): 4209006 Chain smoker: 4044778 Smokes tobacco daily: 42709996 Occasional tobacco smoker: TBD Smoker: 4298794	Cigarette smoker: 4276526 Cigar smoker: 4246415
Ex-cigarette smoker	4092281	281018007	Ex-smoker: 4310250	Ex-cigar smoker: 4052949 Ex-pipe smoker : 4052465

Concept Name	Concept Id	SNOMED Concept Code	Permissible tobacco status concepts	Permissible tobacco type concepts
Ex-cigar smoker	4052949	160621008	Ex-smoker: 4310250	Ex-cigarette smoker : 4092281 Ex-pipe smoker : 4052465
Ex-pipe smoker	4052465	160620009	Ex-smoker: 4310250	Ex-cigarette smoker : 4092281 Ex-cigar smoker: 4052949
Unknown	44814653	PCORnet concept	Moderate smoker (20 or less per day): 4209585 Heavy smoker (over 20 per day): 4209006 Chain smoker: 4044778 Smokes tobacco daily: 42709996 Occasional tobacco smoker: TBD Smoker: 4298794 Ex-smoker: 4310250	None
No Information	44814650	PCORnet concept		
Other	44814649	PCORnet concept		

Related Materials

Hierarchy of the selected tobacco concepts

Tobacco use and exposure - finding			
	Tobacco user		
		Smoker	
			Moderate smoker
			Heavy smoker
			Cigar smoker
			Cigarette smoker
			Pipe smoker
	Tobacco smoking behavior - finding		
		Tobacco smoking consumption - finding	
			Smokes tobacco daily
		Non-smoker	
			Ex-smoker
				Ex-pipe smoker
				Ex-cigar smoker
				Ex-cigarette smoker
			Never smoked tobacco

OBSERVATION Table

The OBSERVATION table captures any clinical facts about a patient obtained in the context of examination, questioning or a procedure. The observation domain supports capture of data not represented by other domains, including unstructured measurements, medical history and family history.

Field	Type	Required	Description	PCORnet Conventions
observation_id	integer	Yes	A unique system-generated identifier for each observation.	
person_id	integer	Yes	A foreign key identifier to the person about whom the observation was recorded.	
observation_concept_id	integer	Yes	A foreign key to the standard observation concept identifier in the Vocabulary.	Valid Observation Concepts belong to the "Observation" domain.
observation_date	date	Yes	The date of the observation	
observation_time	time	No	The time of the observation. The format is text: HH:MI:SS military time.	
observation_type_concept_id	integer	Yes	A foreign key to the predefined concept identifier in the Vocabulary reflecting the type of the observation.	Valid concept_ids found in CONCEPT table where vocabulary_id = 'Observation Type'.
value_as_number	float	No* (see convention)	The observation result stored as a number. This is applicable to observations where the result is expressed as a numeric value.	
value_as_string	varchar(60)	No* (see convention)	The observation result stored as a string. This is applicable to observations where the result is expressed as verbatim text.	
value_as_concept_id	integer	No* (see convention)	A foreign key to an observation result stored as a concept identifier. This is applicable to observations where the result can be expressed as a standard concept from the Vocabulary (e.g., positive/negative, present/absent, low/high, etc.).	Valid concept_ids provided in the tables below
unit_concept_id	integer	No	A foreign key to a standard concept identifier of measurement units in the Vocabulary.	

Field	Type	Required	Description	PCORnet Conventions
provider_id	integer	No	A foreign key to the provider in the provider table who was responsible for making the observation.	
visit_occurrence_id	integer	No	A foreign key to the visit in the visit table during which the observation was recorded.	
observation_source_concept_id		No		
qualifier_source_value	varchar(50)	No	The qualifier code as it appears in the source data. This code is mapped to a standard concept in the Vocabulary and the original code is, stored here for reference.	
observation_source_value	varchar(50)	No	The observation code as it appears in the source data. This code is mapped to a standard concept in the Vocabulary and the original code is, stored here for reference.	
unit_source_value	varchar(50)	No	The source code for the unit as it appears in the source data. This code is mapped to a standard unit concept in the Vocabulary and the original code is, stored here for reference.	

FACT_RELATIONSHIP Table

The FACT_RELATIONSHOP table contains records to detail the relationships between facts within one domain or across two domains, and the nature of the relationship. This table will be used to link Condition_Occurence and Observation domains and records in Measurement domain.

Field	Type	Required	Description	PCORnet Conventions
domain_concept_id_1	integer	Yes	The concept representing the domain of fact one, from which the corresponding table can be inferred.	

Field	Type	Required	Description	PCORnet **Conventions**
fact_id_1	integer	Yes	The unique identifier in the table corresponding to the domain of fact one.	
domain_concept_id_2	integer	Yes	The concept representing the domain of fact two, from which the corresponding table can be inferred.	
fact_id_2	integer	Yes	The unique identifier in the table corresponding to the domain of fact two.	
relationship_concept_id	integer	Yes	A foreign key identifier to a standard identifier of relationship in the Standardized Vocabularies.	•