

OBSERVATIONAL MEDICAL OUTCOMES PARTNERSHIP

OMOP COMMON DATA MODEL (CDM) ETL MAPPING SPECIFICATIONS

July 28, 2009

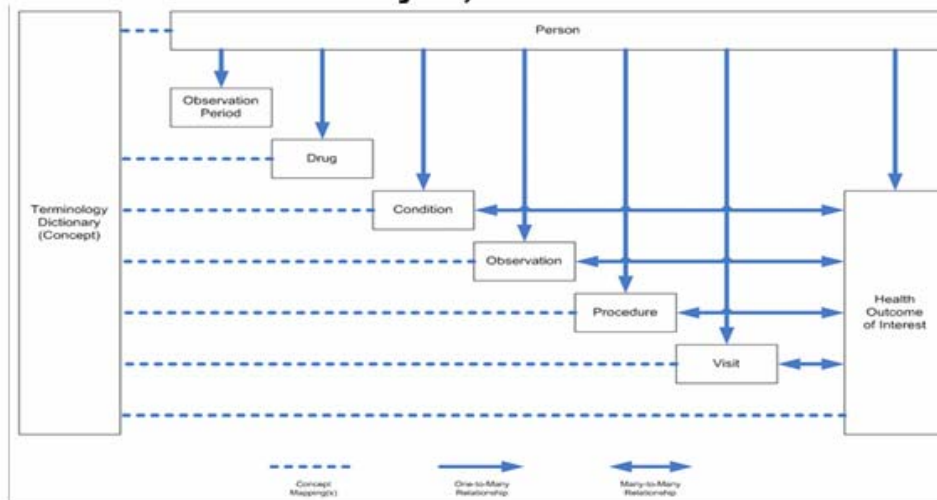


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Document Control

Change Record

Date	Author	Version	Change Reference
22-Jun-2009	Shesh Mudiyanur, Mark Khayter	1.0	New document, describes OMOP ETL mapping process.
14-Sept-2009	Anil Dubey MD		Add PHS Person Table and Drug Exposure Table definitions and business rules (for PHS Source codes/mapping to OMOP Standard)
16-Sept-2009	Patrick Ryan		Reviewer of A Dubey's tables above
21-Sept-2009	M Sordo PhD		Add Condition Occurrence and Procedure Table definitions and business rules for PHS Source codes/mapping to OMOP Standard
14-Oct-2009	Anil Dubey MD		Add Observation Table definitions and business rules for PHS Source codes/mapping to Observation Table (for Results).
23-Oct-2009	Christian Reich		Review of Condition Occurrence, Procedure Table and Observation Table (per above).
2-Nov-2009	M Sordo PhD		Added Visit Occurrence table definition and business rules for PHS
2-Nov-2009	M Sordo PhD		Addressed Christian's comments for Condition and Procedure tables
2-Nov-2009	M Sordo PhD		Added code for PHS condition occurrences to the condition_occurrence_ref table
30-Nov-2009	M Sordo PhD		Final review for assigned content areas (Visit,, Condition and Procedure Tables)
2-Dec 2009	A Dubey MD		Final review for assigned content areas (Person, Observation and Drug Exposure). Inferred Tables: (Condition Era, Drug Era and Observation Period)
Jan 7 2010	A Dubey MD		Change made post OSCAR Review- Document change to Person Table (to truncate pts with YOB < than 1919).

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Document References

Document Title	Type of Reference	Document Location
OMOP CDM Specification		OMOP Basecamp
PHS_OMOP CDM Specification	PHS Documentation for OMOP CDM	

1.0 Introduction

This document reflects the requirements, assumptions, business rules and transformations for the implementation of the Common Data Model (CDM) as presented in the OMOP CDM Specification for Partners Healthcare Systems, Inc (PHS) as a distributed partner.

The purpose of this document is two-fold:

1. Describe ETL mapping of data from PHS sources into Common Data Model.
2. Describe ETL mapping of data from PHS Research Patient Data Repository (RPDR) sources into Common Data Model. The data is limited to inpatient and outpatient data for the following institutions: Massachusetts General Hospital (MGH), Brigham and Women's Hospital (BWH) and Faulkner Hospital (FH).

The document is composed of three main sections:

- Source Data Mapping Approach. Describes major tables of the CDM schema and special data handling required for each table.
- Source Independent Data Mapping. Described mapping processes that will be performed independent of the source feed.
- PHS Data Mapping. PHS mapping definition and transformation specifications for PHS data.

In each section, the tables and their mapping are individually reviewed along with any source specific rules and exceptions.

The intended audience for this document will include both OMOP investigators and ETL technical resources. Sections of the document are targeted towards each of the audiences with appropriate focus and level of detail.

2.0 Assumptions

The design follows the agreed upon general project assumptions:¹

- Electronic Medical Data: EMR is a subset of EHR. This document will reference EHR moving forward even if specific data source might internally use Electronic Medical Record (EMR) definition.
- Financial Information: The CDM model makes no use of financial information such as Fees, Payments, Deductibles, Copayment, etc.
- Plan Detail Information: The model makes no use of any fields related to Plan or

¹ Other, domain specific assumptions are documented in the respective sections

Coverage details such as Benefit Plan, Plan Indicator, etc.

- **Cleansing and Validation:** The selected data fields will be handled (whether loaded directly or as part of a transformation) without any prior cleansing or validation.

Data Privacy: PHS data will be de-identified when transformed to the CDM per CDM specs

- **Concept Identifiers:** In the CDM, the main domains used for drug outcomes research are Drug, Condition, Observation, Procedure, Visit and Demographics. Data are represented through standard concept identifiers using a standardized terminology. During ETL, source data representations (raw data codes) will be translated to standard concept identifiers through a mapping process. If no standard concept identifier is available, the concept identifier field will contain 0 value.
- **Indicators:** Indicators are source tables containing additional information that were used for ETL rules in order to translate source definitions into concept identifiers. Some of the indicators will be retained in the CDM others are used only during ETL conversions.

3.0 Source Data Mapping Approach

This section covers the high-level assumptions and approach to extraction, transformation and loading (ETL) of raw source data into the Common Data Model (CDM). The assumptions and approach are defined with a special focus on submitted claims data and EHR data. The section covers each of the major tables in the CDM separately, elaborating the distinct handling required for each.

Unless otherwise specified, missing attributes will not disqualify data from being loaded into the Common Data Model. Missing attributes for Concept Identifiers will be populated with the value zero (0) in the CDM, while the rest of the missing attributes will be populated with NULL.

3.1 Table Name: PERSON

The Person entity is one of the basic dimensions of analysis: when combined with the Dictionary Tables and Drug Exposure, Condition, Observation, and Procedure tables, it will provide the framework for active drug surveillance.

The PERSON table has the following characteristics:

- The table will store a single record for each person identified from the source data.
- PERSON_ID is used to uniquely identify each person. It serves as the foreign key for the person reference in all other dimension tables in the Common Data

Model.

- PERSON_ID is required information for PERSON table.
- SOURCE_PERSON_KEY can be used to store the native RPDR encrypted patient identifier. This allows for a link to the source data used to populate this table.
- Person demographic attributes, as available, are extracted from the source data and translated into standard concept identifiers.
- Absence of any person demographic attribute will not disqualify a person record from being loaded into the Common Data Model.
- The person Year of Birth will be determined / approximated based on the source data. The precise age and date of birth details are out of scope for the CDM.
- Since precise age and date of birth details are out of scope for the CDM, it cannot be used for precise analysis of outcomes of infants, which would require a month or week-based age.

3.2 Table Name: DRUG_EXPOSURE

Drug Exposure contains individual records that suggest drug utilization by the person. Drug Exposure indicators store key information about each person medication and the timing thereof, including the drug (captured as standard concept identifier in the Dictionary), quantity, begin date of medication, number of days supply, period of exposure, and prescription refill data.

Transformation of source data for extraction of Drug Exposure data will be based on the following assumptions:

- Drug Exposures are captured based on a variety of indicators from the source data. They may include written prescriptions, person medication lists, filled prescriptions, and procedure codes related to drug administration. PHS does not have access to filled prescription data.
- DRUG_EXPOSURE_ID, PERSON_ID, DRUG_EXPOSURE_START_DATE, DRUG_EXPOSURE_TYPE, SOURCE_DRUG_CODE are required fields for DRUG_EXPOSURE table.
- Procedures related to physician/inpatient administration of drugs are also related to drug exposure and will be added to DRUG_EXPOSURE table. In the source data procedures are coded in a variety of ways (e.g., HCPCS, CPT-4, and ICD-9-CM).
- Drug Exposure dates are captured from the source data whenever available. In some cases, alternate fields are used to approximate the start date.
- End dates are not estimated for Drug Exposures in instances where they are not available from source data; they are estimated for the DRUG_ERA table (see section 3.3 and 4.3.1 for additional information).
- Drug codes from the source data are translated into standard drug concepts, where both the source drug identifier and the standard drug concept identifier are stored in the Drug Exposure record. If the source drug identifier cannot be translated into a standard drug concept, only the source drug identifier is stored.
- A Drug Exposure Type attribute identifies source specific detail from which the

Drug Exposure was captured (e.g., prescription dispensed, medication list, physician administered drug, etc.), the characteristic of the exposure, and the level of aggregation.

3.3 Table Name: DRUG_ERA

Drug Exposures that are recorded in successive periods (e.g., drug prescription and refill claims) are combined to form one continuous period of exposure to a drug concept.

This is based on certain rules:

- Source data for Drug Era creation are the Drug Exposure data as captured from available data sources and stored in the DRUG_EXPOSURE table.
- Drug Eras will be created using the standard drug concepts and can be aggregated using higher level drug concepts from the standardized terminology.
- Drug Eras infer end dates for individual exposures based on the drug exposure type.
- Individual drug exposures can end up in multiple Drug Eras based on the drug concept hierarchy. Drug Eras are constructed based on RxNorm drug ingredient concepts. Drug exposures created based on lower level drug concept or aggregated based on corresponding drug ingredients using drug hierarchy.
- Drug Eras aggregate exposures are recorded from a variety of sources. Availability and reliability of end dates for Drug Exposure periods vary greatly in the source data. Reasonable approximations are used to determine the end dates for individual exposures where appropriate. (See sections 4.3.1 for rules used to calculate End Date).
- DRUG_ERA_ID, PERSON_ID, DRUG_ERA_START_DATE, DRUG_ERA_END_DATE, DRUG_EXPOSURE_TYPE, DRUG_CONCEPT_ID, and DRUG_EXPOSURE_COUNT are required fields for DRUG_ERA table.

3.4 Table Name: CONDITION_OCCURRENCE

Condition Occurrences record individual instances of the person conditions (diagnosis) extracted from source data. Conditions are recorded in various data sources in different forms with varying levels of standardization. For example:

- ICD-9-CM diagnosis that are submitted as part of a claim for health services and procedures.
- EHRs that capture person conditions in the form of diagnosis codes and symptoms as part of a problem list. (Note- Problem list data is captured in the [Observation Table](#))
- Mortality when observed in person status codes (such as discharge status).

Transformation of source data for Condition Occurrences is based on the following assumptions:

- Source condition codes will be mapped to standard concept identifiers, when possible. Concept identifiers will have the value of zero (0) if no mapping from the source code is available.

- `CONDITION_OCCURRENCE_ID`, `PERSON_ID`, `SOURCE_CONDITION_CODE`, `CONDITION_START_DATE`, `CONDITION_OCCUR_TYPE` are required fields for `CONDITION_OCCURRENCE` table.
- End dates are not estimated for Condition Occurrences in instances where they are not available from source data. However they are estimated for the `CONDITION_ERA` table (see section 3.5 below).
- A Condition Occurrence type identifies the source from which the person conditions were drawn or inferred (Inpatient Header Primary, Inpatient Detail, Problem List, Death at Discharge, etc.).

3.5 Table Name: `CONDITION_ERA`

Condition Eras are defined as chronological periods of Condition Occurrences, constructed by combining individual records that serve as indicators for the presence of a person's condition. Combining individual Condition Occurrences into a single Condition Era serves two purposes:

- Aggregation of chronic conditions that require continuous ongoing care which refer to the same underlying illness.
- Aggregation of multiple, closely-timed events in case of chronic or acute conditions.

Condition Eras are not intended to reflect the full period of time a person has an underlying condition (e.g., chronic conditions that persist indefinitely following initial diagnosis), but instead reflects episodes of care for a given condition that can be inferred from the data.

ETL procedures for the Condition Eras are created based on the following assumptions:

- Source data for Condition Era creation would be the Condition Occurrence data as captured from available data sources and stored in the Common Data Model.
- Condition Eras will be created using the same condition concepts associated with the individual Condition Occurrences.
- Availability of end dates for Condition Occurrence periods vary by the source. In cases when end date is missing in the source data, start date will be used to calculate era end date. (See sections 4.3.2 for rules used to calculate End Date).
- `CONDITION_ERA_ID`, `PERSON_ID`, `CONDITION_CONCEPT_ID`, `CONDITION_START_DATE`, `CONDITION_END_DATE`, `CONDITION_OCCUR_TYPE`, `CONDITION_OCCURRENCE_COUNT` are required fields for `CONDITION_ERA` table.

3.6 Table Name: `VISIT_OCCURRENCE`

The `VISIT_OCCURRENCE` entity contains the information available in the source data about person visits to healthcare providers, including inpatient, outpatient, and ER visits. Visits are recorded in various data sources in different forms with varying levels of standardization. The detail level of the classification and description of the visit differs by data source. For example:

- Submitted Medical Claims include Inpatient Admissions, Outpatient Services, and Emergency Room visits.
- Electronic Health Records may capture the person visits as part of the activities recorded.

A Visit Occurrence is recorded for each visit to a health care facility. Each visit is standardized by assigning a corresponding concept identifier based on the type of facility visited.

Visit occurrence will be identified by defining CPT codes for ED visits and Outpatient Visits . Inpatient Visits will be defined by evaluating inpatient encounters with length of stay indicator.

Transformation of source data for extraction of Drug Exposure data will be based on the following assumptions:

- VISIT_OCCURRENCE_ID, PERSON_ID, SOURCE_VISIT_CODE, VISIT_START_DATE, VISIT_CONCEPT_ID are required fields for VISIT_OCCURRENCE.
- Availability of end date for Visit Occurrence varies by the source. If it is not available in the source data it will not be inferred.

3.7 Table Name: PROCEDURE_OCCURRENCE

Procedure occurrences record individual instances of medical procedures extracted from source data. Procedures are recorded in various data sources in different forms with varying levels of standardization. For example:

- Medical Claims include CPT-4, ICD-9-CM (Procedures), and HCPCS procedure codes that are submitted as part of a claim for health services rendered.
- Electronic Health Records that capture CPT-4, ICD-9-CM (Procedures), and HCPCS procedures as orders.

Procedure Occurrences are recorded for each procedure performed on a person. Each procedure is standardized by assigning a concept identifier from the standardized terminology, where possible.

Transformation of source data for Procedure Occurrences is based on the following assumptions:

- Source procedure codes/descriptions are checked for standardization. If the source attributes are available as standard procedure codes (e.g., ICD-9-CM, CPT-4, HCPCS Procedure Codes) then they are mapped to the same standard concepts in the Dictionary (if available in the current standard). If the source procedure code/description is non-standard, then they are mapped to a standard concept identifier as defined in the Dictionary, where possible.
- PROCEDURE_OCCURRENCE_ID, PERSON_ID, PROCEDURE_DATE, SOURCE_PROCEDURE_CODE, PROCEDURE_CONCEPT_ID, PROC_OCCUR_TYPE are required fields for PROCEDURE_OCCURRENCE table.

- A Procedure Occurrence type identifies the source from which the person procedure was drawn (such as procedure from inpatient or outpatient claim).
- Procedure Occurrences are recorded from all available sources. There is a possibility that a single instance of a person procedure may be recorded more than once from different indicators. The Procedure Occurrence Type identifies the indicators from which the occurrence was recorded and allows the investigator to compensate for such possibility.

As an example procedure “Bronchial Fistula close” can be read from Inpatient claim header data as ICD-9-CM procedure code “33.42 (Closure of bronchial fistula)”, can also be listed in inpatient detail with a CPT-4 code of “32815 (Open closure of major bronchial fistula)”. In this instance, the procedure occurrence for ICD-9-CM 33.42 is marked with a procedure occurrence type of “Inpatient Header” and CPT-4 32815 is marked with a procedure occurrence type “Inpatient Detail”.

3.8 Table Name: OBSERVATION

The Observation entity contains all general observations from the following categories:

- Lab observations (i.e. test results) from Medical Claims
- Lab and other observations from Electronic Health Records
- Person chief complaints as captured in Electronic Health Records
- Person problems list as captured in Electronic Health Records

For each Observation, the tracked attributes include source observation code, matching standard concept identifier, date of the observation, type of observation, type of result recorded as number/text/concept identifier and reference range for numeric results.

The approach to the extraction and representation of observation data are based on the individual data source, but the following guidelines are common to all data sources:

- Source observation identifiers are mapped to the standardized terminology where possible. Standard concept identifiers are set to zero (0) if no such mapping exists.
- OBSERVATION_OCCURRENCE_ID, PERSON_ID, OBSERVATION_TYPE, SOURCE_OBSERVATION_CODE, OBSERVATION_DATE, and OBSERVATION_CONCEPT_ID are required fields for OBSERVATION table.
- Observation results are captured as numeric values and/or text results based on source data. For source data where text observation results match values in the list of standard logical values (such as Positive, Negative, Trace etc.), results are captured as concept identifier.
- An Observation Type is assigned based on the type of source data from which the observation was extracted and type of result expected.

3.9 Table Name: OBSERVATION_PERIOD

Observation Period is designed to record the periods of time where a person may have data recorded. In claims data, this is commonly represented by periods of enrollment in specific insurance plans. In electronic health record data, this may represent the span of time where observations have been recorded for a person.

A person may have multiple Observation Periods if data capture is not continuous or the type of observation changes during the observation period. For example, a person may have two non-consecutive enrollments in a claims data, or may have plan coverage change such that one period of time has drug data, while a subsequent period does not have drug data. [PHS does not have access to plan coverage information.](#)

Tracking the person status during an Observation Period requires unique handling for each raw data source from which the person data is extracted. This is based on the following assumptions:

- [Since PHS does not have access to enrollment information, a single observation period for each person in the database is obtained by identifying the earliest and latest entry in the source RPDR observation fact table \(dbo.dw_f_conc_noval\).](#)
- OBSERVATION_PERIOD_ID, PERSON_ID, OBSERVATION_START_DATE, and OBSERVATION_END_DATE are required fields for OBSERVATION_PERIOD table.

4.0 Source Data Mapping

[This section will describe mapping process and ETL conversions of data received from PHS data into Common Data Model.](#)

[The ETL process will load all available data into the CDM; the source data for this ETL will be the PHS RPDR research database and the PHS staging tables \(used in the PHS RPDR research database ETL process\). The process of loading into the PHS staging tables is outside of the scope of this document.](#)

[Both the source data \(RPDR database tables and PHS RPDR ETL staging tables\) and the CDM will be hosted on the Microsoft SQL Server database platform. Custom SQL queries specific to the OMOP study will be written to transform and load the source data into the OMOP CDM. The mapping process described below will be performed to transform and load the source data into the CDM.](#)

[Process of mapping from source data to CDM will list all entities in CDM schema and will define which information in source data items will be mapped to which items in CDM.](#)

[Note: Not all CDM items are available in the source data. Missing items will contain null values in CDM schema.](#)

4.1 PHS Electronic Health Records (EHR) Data Mapping

PHS EHR data is provided to OMOP as a set of CSV source files that consists of single set of the person information. Using SQL program, EHR data will be loaded into a single schema to hold PHS EHR information.

4.1.1 TABLE NAME: PERSON

Person entity contains the person identifier and demographics attributes. The attributes related to the person demographics are mapped to standard concepts in the Dictionary, and the corresponding concept identifiers are stored as attributes in the PERSON table. Source of the person information exists in the Research Patient Data Registry (RPDR) patient dimension table referenced below. table.

The field mapping is performed as follows:

Destination Field	Source Field	Applied Rule	Comment
PERSON_ID REQUIRED (R)	N/A	System generated number (auto incrementing identity column). Must be unique Pt ID	In compliance with HIPAA regulations, the value of PATIENT_ID is de-referenced from any person information
YEAR_OF_BIRTH	DW_DM_PATIENT.date_of_birth	Person Year of Birth is calculated as follows: Patient Year of Birth = Year(date_of_birth) from RPDR patient dimension table RPDR_19.dbo.dw_dim_patient.	SELECT YEAR(date_of_birth) FROM RPDR_19.dbo.dw_dim_patient NOTE: All pts with Years of birth on or before 1919 are assigned a value of 1919. The net effect is that these patients will be grouped in the same YOB group (1919) in the OSCAR output tables (in order to comply with HIPAA recommendations).
GENDER_CONCEPT_ID	DW_DM_PATIENT.SEX_CD	Values mapped to OMOP standardized vocabulary. Values mapped to OMOP standardized vocabulary. Matching Concept ID extracted from the SOURCE_TO_CONCEPT_MAP table using the following rule:	Lookup table will translate local values to Concept Ids. source_to_concept_map (mapping_type = 'GENDER')

Destination Field	Source Field	Applied Rule	Comment
		<p>If sex_cd IS: 'M' Then target (omop) concept id is 8507</p> <p>If sex_cd IS: 'F' THEN target (omop concept_id) is: 8532</p> <p>IF sex_cd IS 'U' or '@' or NULL THEN target (omop concept_id) is: 8551</p>	
RACE_CONCEPT_ID	DW_DM_PATIENT.RACE_CD	<p>Values mapped to OMOP standard Race Concept.</p> <p>Matching Concept ID extracted from the SOURCE_TO_CONCEPT_MAP table using the following rules:</p> <pre> IF race_cd IN ASIAN,'A','API','ASIAN/PAC. ISL','OR','ORIENTAL','IN','INDIAN' THEN omop concept_id IS 8515 IF race_cd IN B','BLACK','AA', THEN omop concept_id IS 8516 IF race_cd IN H','HISPANIC','SPANISH','LATINO' THEN omop concept_id IS 8558 IF race_cd IN AMER. INDIAN,'I','NA','NAT. AM.','NI','NAVAJO','NV','ES','ESKIMO','NA.ESK THEN omop concept_id IS 8657 IF race_cd IN @','D','DEFERRED','R','REFUSED','U',' UNK','UNKNOWN','DEC','DECLINED','UNAVAILA BLE' THEN omop concept_id IS 8552 </pre>	<p>source_to_concept_map(mapping_type = 'RACE')</p>

Destination Field	Source Field	Applied Rule	Comment
		<p>IF race_cd IN C,'W','WHITE','WHITE/CAUCASIAN'</p> <p>THEN omop concept_id IS 8527</p> <p>IF race_cd IN HIS/WHITE,'HIW','CAUCASIAN','AM IND/WHITE','ASIAN/WHITE','BLACK/WHITE','HIB ';HIS/BLACK','HIS/WHITE','HIW','AM IND/WHITE','BLACK/NATIVE','BLACK/HAWAII','B LACK/ASIAN','BLACK/WHITE','MR','MULTI','ASIA N/AMER IND','ASIAN/WHITE','ASIA/NAT HAWAII','BLACK/ASIAN','O','OTHER','ALEUTIAN' ,AL','ASIAN AMER IND','M','MID.EASTERN'</p> <p>THEN omop concept_id IS 8522</p> <p>IF race_cd IN 'NAT. HAWAIIAN','NATIVE HAWAIIAN OR OTHER PACIFIC ISLANDER','NATIVE HAWAIIAN/OTHER PACIFIC ISLANDER','ASIA/NAT HAWAII'</p> <p>THEN omop concept_id IS 8557</p>	
LOCATION_CONCEPT_ID	DW_DIM_PATIENT	<p>Values mapped to OMOP standardized Location concept.</p> <p>Values mapped to OMOP standardized Location concept.</p> <p>Matching Concept ID extracted from the SOURCE_TO_CONCEPT_MAP table using the following rules:</p> <p>Extract TARGET_CONCEPT_ID for - MAPPING_TYPE of 'LOCATION' SOURCE_VOCABULARY_CODE corresponding to 'RPDR' and SOURCE_CODE matching first 3 characters of</p> <p>LEFT(zip_cd) from table dw_dim_patient</p> <p>If no matching values found, store the value zero (0).</p>	RPDR data includes only the first three digits of the Location Zip. Complies to HIPAA law.
SOURCE_PERSON_KEY		NULL	We will not perform source verification, this data is de-identified.

Destination Field	Source Field	Applied Rule	Comment
SOURCE_GENDER_CODE	DW_DM_PATIENT.SEX_CD		:
SOURCE_LOCATION_CODE	DW_DIM_PATIENT.ZIP_CD		
SOURCE_RACE_CODE	DW_DIM_PATIENT.RACE_CD PATIENT_D.RACE		

4.1.2 TABLE NAME: DRUG_EXPOSURE

PHS carry four (4) separate sources of drug exposure data. The primary sources of the data consist of written prescriptions in the LMR_Medications table in the LMR_Staging DB (LMR Rx), the Oncall_medications table in the Oncall_Staging DB (Oncall Rx), and the mghtsi_validmeds table in the MGHTSI_Staging db and bwhtsi_validmeds table in the BWHTSI_Staging db.

4.1.2.1 Transformation from PHS Medication / Prescriptions Data

Data will be mapped from medication facts in the fact table (dbo.dw_f_conc_noval) of the RPDR (RPDR_19), with additional data drawn in from the relevant staging db (LMR_Medications in the LMR_Staging DB .

It is advantageous to use the additional info in these staging tables b/c they offer useful additional information such as dose, route, frequency, strength, refills, etc.

There is not such additional data found in the inpatient med staging tables; thus, here the info will be exclusively from the RPDR fact table (dbo.dw_f_conc_noval on RPDR_19).

The field mapping is performed as follows:

Destination Field	Source Field	Applied Rule	Comment
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Destination Field	Source Field	Applied Rule	Comment
DRUG_EXP OSURE_ID	(Required- R)	System generated unique identifier	
DRUG_EXP OSURE_STA RT_DATE	(Required- R) PHS Field: start_date_t ext (Imr) start_date of the correspondi ng entry in the RPDR fact table dw_f_conc_ noval	The start date is obtained by using the following logic: For Imr meds: If the start_date_text (Imr) is not null in the table LMR_Medications in the LMR Staging area, then use it. Otherwise, use the start_date of the corresponding entry in the RPDR fact table dw_f_conc_noval. For all other meds,the date used is the start_date in the fact table dw_f_conc_noval.	
DRUG_EXP OSURE_EN D_DATE	stop_date_t ext in the table LMR_Medic ations	For Records from PHS FIELD The end date is obtained by using the following logic: For Imr meds: Use the end_date stored in the field stop_date_text of the corresponding entry in the table LMR_Medications in the LMR Staging area. For all other meds,the date used is the end_date field in the fact table dw_f_conc_noval.	
PERSON_ID	Patient_id_e (same identifier as used in the RPDR)		

Destination Field	Source Field	Applied Rule	Comment
DRUG_CONCEPT_ID	<p>NDC or RxCUI</p> <p>NOTE: concept_id in dw_f_conc_noval where the concept_id is IN medications dictionary of RPDR</p>	<p>Mapped to OMOP standardized Drug concept.</p> <p>Matching Concept ID extracted from the SOURCE_TO_CONCEPT_MAP table using the following rule:</p> <p>Extract TARGET_CONCEPT_ID for - MAPPING_TYPE of 'DRUG'</p> <p>to concept_id in dw_f_conc_noval where the concept_id is IN medications dictionary of RPDR.</p> <p>For 97% of medications in RPDR, are represented with Multum Drug ID's dbo.dw_f_conc_noval</p> <p>Will be mapped to NDC or RxCUI</p>	
DRUG_EXPOSURE_TYPE	DRUG_EXPOSURE_REF	<p>For Records from PHS</p> <p>THE DRUG EXPOSURE TYPE IS DETERMINED BASED ON THE FOLLOWING:</p> <p>THE "CODING SCHEME" IS DERIVED FROM THE CONCEPT_ID IN DW_F_CONC_NOVAL. DEPENDING ON WHAT THE SOURCE VOCABULARY IS, THE CODING SCHEME CAN TAKE ON THE FOLLOWING VALUES:</p> <p>'CPT' 'HCPCS' 'LMR' 'INPATIENT'</p> <p>'INVESTIGATIONAL' 'UNDEFINED_CODES' 'BAD_CONCEPTS' 'MUL(LMEDVX) Devices' 'MUL(LMEUCX) zz Unclassified'</p> <p>IN IMPORTING DATA FROM THE RPDR CODES OF THE FOLLOWING CODING SCHEMES WILL NOT BE IMPORTED:</p> <p>'INVESTIGATIONAL' 'UNDEFINED_CODES' 'BAD_CONCEPTS' 'MUL(LMEDVX) Devices' 'MUL(LMEUCX) zz Unclassified'</p> <p>THE DRUG EXPOSURE TYPE IS DETERMINED BY THE FOLLOWING MAPPING OF PRIMARY AND DERIVED SOURCE DATA TO DRUG EXPOSURE TYPE DESCRIPTION:</p> <p>WHEN CODING SCHEME IS 'LMR': look at prescription flag; if =1 then "prescription written"; otherwise, "medication list"</p>	Type identifier is based on the source from which the Drug Exposure was recorded.

Destination Field	Source Field	Applied Rule	Comment
		<p>WHEN CODING SCHEME IS 'CPT' 'medication procedure'</p> <p>WHEN CODING SCHEME IS 'HCPCS' 'medication procedure'</p> <p>WHEN CODING SCHEME IS 'INPATIENT' 'Inpatient Administration'</p>	
STOP_REASON		FOR PHS Stop Reason Does not apply	
REFILLS	PRESCRIPTION_REFILLS	<p>For LMR Meds when the prescription flag is = 1: the field named refills in the table LMR_Medications in the LMR Staging area is used. Sometimes this value will be null.</p> <p>In all other situations, a null value is assumed.</p>	
DRUG_QUANTITY	dispense_quantity LMR_Medications	<p>For LMR meds when the prescription flag is set to 1, the value contained in the field named dispense_quantity in the table LMR_Medications in the LMR Staging area is used.</p> <p>In all other circumstances, a null value is assumed.</p>	
DAYS_SUPPLIED	Duration LMR_Medications	<p>For LMR Meds when the prescription flag attribute in the LMR_Medications table is set to 1, the value contained in the field named duration is used.</p> <p>Sometimes this will be null.</p> <p>In all other instances, a null value is assumed.</p>	
SOURCE_DRUG_CODE	(Required- R) dbo.dw_fact_conc_noval.concept_id	Concept_id (from RPDR_19 fact table dbo.dw_fact_conc_noval)	

Destination Field	Source Field	Applied Rule	Comment

4.1.2.2 Transformation from PHS Procedure Data

Detail description of each procedure code associated with the charge data are applicable.

A subset of the procedures is related to administration of medications. The CPT-4 code from the source data is stored as the SOURCE_DRUG_CODE and the standard drug concept associated with the CPT-4 code is recorded as DRUG_CONCEPT_ID.

In all other respects, the population of the fields in the CDM is exactly as specified above in the previous section.

The field mapping is performed as follows:

Destination Field	Source Field	Applied Rule	Comment
DRUG_EXP OSURE_ID		System generated unique identifier	
DRUG_EXP OSURE_STA RT_DATE	(Required- R) PHS Field: start_date_t ext (lmr) start_date of the correspondi ng entry in the RPDR fact table dw_f_conc_ noval	Same as above The start date is obtained by using the following logic: For drug procedure codes: If the start_date_text (lmr) is not null in the table LMR_Medications in the LMR Staging area, then use it. Otherwise, use the start_date of the corresponding entry in the RPDR fact table dw_f_conc_noval. For all other drug procedure codes ,the date used is the start_date in the fact table dw_f_conc_noval.	
DRUG_EXP OSURE_EN D_DATE	end_date (oncall) end_date_t ext (lmr)	See above	

Destination Field	Source Field	Applied Rule	Comment
PERSON_ID		Per Person Table	
DRUG_CONCEPT_ID	dbo.dw_f_conc_noval.concept_id	<p>Mapped to OMOP standardized Drug concept.</p> <p>Matching Concept ID extracted from the SOURCE_TO_CONCEPT_MAP table using the following rule:</p> <p>Extract TARGET_CONCEPT_ID for - MAPPING_TYPE of 'PROCEDURE DRUG' to concept_id in dw_f_conc_noval where the concept_id is IN medications dictionary of RPDR.</p> <p>If no matching values found, store the value zero (0).</p>	
DRUG_EXPOSURE_TYPE	DRUG_EXPOSURE_REF. DRUG_EXPOSURE_TYPE	<p>For Records from PHS</p> <p>THE DRUG EXPOSURE TYPE IS DETERMINED BASED ON THE FOLLOWING:</p> <p>THE "CODING SCHEME" IS DERIVED FROM THE CONCEPT_ID IN DW_F_CONC_NOVAL. DEPENDING ON WHAT THE SOURCE VOCABULARY IS, THE CODING SCHEME CAN TAKE ON THE FOLLOWING VALUES:</p> <p>'CPT' 'HCPCS' 'INPATIENT'</p> <p>'INVESTIGATIONAL' 'UNDEFINED_CODES' 'BAD_CONCEPTS' 'MUL(LMEDVX) Devices' 'MUL(LMEUCX) zz Unclassified'</p> <p>IN IMPORTING DATA FROM THE RPDR CODES OF THE FOLLOWING CODING SCHEMES WILL NOT BE IMPORTED:</p> <p>'INVESTIGATIONAL' 'UNDEFINED_CODES' 'BAD_CONCEPTS' 'MUL(LMEDVX) Devices' 'MUL(LMEUCX) zz Unclassified'</p> <p>THE DRUG EXPOSURE IS THAT OF THE DRUG EXPOSURE TYPE DESCRIPTION MATCHES THE FOLLOWING:</p> <p>WHEN CODING SCHEME IS 'CPT' 'medication procedure'</p> <p>WHEN CODING SCHEME IS 'HCPCS' 'medication procedure'</p> <p>WHEN CODING SCHEME IS 'INPATIENT' 'Inpatient Administration'</p> <p>Type identifier defined based on the source</p>	

Destination Field	Source Field	Applied Rule	Comment
		from which the Drug Exposure was recorded.	
STOP_REASON		Info not available NULL	Not available in PHS EHR
REFILLS		NULL	Not available in PHS EHR
DRUG_QUANTITY		NULL	Not available in PHS EHR
DAYS_SUPPLY		NULL	Not available in PHS EHR
SOURCE_DRUG_CODE	dbo.dw_f_conc_noval.concept_id		

4.1.3 TABLE NAME: CONDITION_OCCURRENCE

Condition Occurrence data are stored mainly in the RPDR_19.dbo. dw_f_conc_noval and type of encounter: dw_dim_enct (for type of encounter as one of I: inpatient, O: outpatient)

The concept_id for a condition is encoded using one of two possible codes:

1. ICD9 for IDX (outpatient) and
2. TSI (inpatient) systems

NOTE Partners dictionary problems will be populated in the Observation Table

The concept_id is mapped to the source_mapping table to extract the target_concept_id.

PHS Problem list does not have update attributes and does not have a chain to identify most current problems. There is no way to track links between related problem instances other than them having the same concept_id and by using the start_date as means of 'chaining up' those records into a timeline for a given condition.

Also, there is no way to determine the end_date of a condition, since, although the field exists in our databases, we do not populate it with valid data. Similarly, we do not document STOP_REASON for conditions.

All conditions with an ICD9 code do not have a qualifier in the source tables. All these instances are recorded with a DX_QUALIFIER = 'Diagnosis of'.

All other conditions with a qualifier are excluded from this table and added to the observation_occurrence table. We can identify DX_QUALIFIER for LMR records (so far), and for these records we retrieve the modifier from LMR_Problems.Modifiers for conditions in the condition table with same patient_id, condition_id and service_date. We will further group our identifiers into (at least) the following categories:

- 'Family History of' <- Haven't identified any labels for this modifier,
- 'Risk of' = (Risk of, RSK),
- 'History of' = (H/O, HO, History of, HO QO),
- 'Rule out' = (R/O, RO, Rule out),
- 'Status post' = (S/P, SP, Status post),
- 'Question of' = (?, QO, QO HO, QU, QU HO, QU~FH, QU~HO, Question of)
- 'Presumptive of' = (PR)
- 'Negative History of' = (NEG H/O)

Following is the field mapping used for transformation of the Partners' fact data into Condition Occurrence data in the Common Data Model:

Destination Field	Source Field	Applied Rule	Comment
CONDITION_OCCURRENCE_ID REQUIRED		System generated unique identifier	
CONDITION_START_DATE REQUIRED	RPDR_19.dbo.dw_f_conc_noval.start_date	RPDR_19.dbo.dw_f_conc_noval.start_date = condition_start_date	
PERSON_ID REQUIRED	RPDR_19.dbo.dw_f_conc_noval.patient_id_e	RPDR_19.dbo.dw_f_conc_noval.patient_id_e We will use person_id from the person table. For this we need apply this condition: dw_f_conc_noval.person_id_e = person.source_person_key	
CONDITION_END_DATE	N/A	n/a RPDR_19.dbo.dw_f_conc_noval.end_date is the same as RPDR_19.dbo.	

Destination Field	Source Field	Applied Rule	Comment
		dw_f_conc_noval.start_date	
CONDITION_OCCUR_T YPE	RPDR_19.dbo. dw_f_conc_noval.principa l_concept AND dw_dim_enct.inou t_cd	<p>This is identified in the condition_occurrence_ref table where there's a mapping specifically for PHS with codes determined as follows:</p> <p>RPDR_19.dbo. dw_f_conc_noval.principal_concept</p> <p>With possible values of:</p> <p>0: Admitting 1: Primary 2: Secondary @: unassigned (not used)</p> <p>Combined with dw_dim_enct.inout_cd</p> <p>With possible values of:</p> <p>O: Outpatient I: Inpatient U: ??? C: ??? NULL: null @: unassigned???</p> <p>See 4.3.3. for complete list of derived codes</p>	See CONDITION_OCCURRENC E_REF table for added codes (Sec 4.3.3)
CONDITION_CONCEPT_ID	RPDR_19.dbo.dw_f_conc_noval.concept_id	Target_concept_id from source_to_concept_map table where source_condition_code = formatted RPDR_19.dbo.dw_f_conc_noval.concept_id (ICD9 code for condition)	
STOP_REASON	N/A	N/A	
DX_QUALIFIER		DX_Qualifier set to 'Diagnosis of'	We only added those conditions with no identifier-see above
SOURCE_CONDITION_CODE	RPDR_19.dbo.dw_f_conc_noval.concept_id	Formatted ICD9 code for condition. We only added those conditions with an ICD9 code. Conditions with other codes have a dx_qualifier attached, and hence they were added to the observation table	

Destination Field	Source Field	Applied Rule	Comment

4.1.4 TABLE NAME: VISIT_OCCURRENCE

Visit Occurrences are designed to capture and define every person visit to a healthcare facility. Visit Occurrences are recorded based on the activity data in the Electronic Health records. Visit Occurrences are classified by mapping them to OMOP generated visit concepts that define the type of healthcare facility associated with the person visit.

A single entry is recorded for each visit with the associated dates and concept identifiers to define the type of healthcare facility visited.

Visits to healthcare facilities are recorded in the `.DBO.DW_F_CONC_NOVAL` fact table

The field mapping is performed as follows:

Destination Field	Source Field	Applied Rule	Comment
VISIT_OCCURRENCE_ID		System generated unique identifier	
VISIT_START_DATE	RPDR_19.dbo.dw_f_conc_noval.start_date	RPDR_19.dbo.dw_f_conc_noval.start_date	Start date for the person visit.
VISIT_END_DATE	RPDR_19.dbo.dw_f_conc_noval.end_date	For outpatient and ED visits: RPDR_19.dbo.dw_f_conc_noval.end_date For inpatient visits: If there are overlapping inpatient visits within the same institution, we take the earliest start_date and maximum end_date for overlapping visits Inpatient visits at different institutions are considered independent and documented as separate visits.	End date for person visit
PERSON_ID	RPDR_19.dbo.dw_f_conc_noval.patient_id_e	RPDR_19.dbo.dw_f_conc_noval.patient_id_e We will use person_id from the person table. For this we need apply this condition:	Identifier for the Person for whom the Visit Occurrence is being recorded

Destination Field	Source Field	Applied Rule	Comment
		<code>dw_f_conc_noval.person_id_e = person.source_person_key</code>	
VISIT_CONCEPT_ID	RPDR_19.dbo.dw_f_conc_noval.concept_id	<p>For outpatient and ED visits:</p> <p>The source <code>_visit_code</code> is the formatted RPDR_19.dbo.dw_f_conc_noval.concept_id CPT code for the visit. So <code>Visit_concept_id</code> is the target <code>concept_id</code> that corresponds to the <code>source_visit_code</code></p> <p>For inpatients:</p> <p>The target code used is 8717 ('INPATIENT HOSPITAL')</p>	Standard concept identifier associated with the type of visit/service.
SOURCE_VISIT_CODE	RPDR_19.dbo.dw_f_conc_noval.concept_id	<p>For outpatient and ED visits: It is the formatted CPT code for the visit</p> <p>For inpatient visits, it is 'TSI:LOS'</p>	Type/Source of the visit from source data.

4.1.5 TABLE NAME: PROCEDURE_OCCURRENCE

Procedure codes are captured in the RPDR_19.dbo.dw_f_conc_noval table as facts. Procedure codes from RPDR_19.dbo.dw_f_conc_noval are CPT-4, HCPCS and ICD9 codes. Codes are stored in the `concept_id` field of the table. For CPT and HCPCS codes `concept_id` needs to be 'cleaned up' to remove a prefix 'C' attached to the code. Partners ICD9 codes have a prefix of 'P' and the period in the code is removed. To retrieve the standard code, the function `SUBSTRING(p.i_icd9, 2, 50)` returns the ICD9 code in its standard format. The `dw_f_conc_noval` needs to be joined with the Procedures table:

The extracted data mapping to the various fields are as follows:

Destination Field	Source Field	Applied Rule	Comment
PROCEDURE_OCCURRENCE_ID		System generated unique identifier	
PROCEDURE_DATE	RPDR_19.dbo.dw_f_conc_noval.start_date	<code>RPDR_19.dbo.dw_f_conc_noval.start_date</code>	
PERSON_ID	RPDR_19.dbo.dw_f_conc_noval.patient_id_e	<p><code>RPDR_19.dbo.dw_f_conc_noval.patient_id_e</code></p> <p>We will use <code>person_id</code> from the person table. For this we need apply this condition: <code>dw_f_conc_noval.person_id_e =</code></p>	

Destination Field	Source Field	Applied Rule	Comment
		<p>person.source_person_key</p>	
<p>PROCEDURE_CONCEPT_ID</p>	<p>RPDR_19.dbo.dw_f_conc_noval.concept_id</p>	<p>The source for concept_id for procedures is rpdr_19.dbo.Procedures. There are four possible code types for procedures:</p> <ol style="list-style-type: none"> 1. CPT 2. ICD9 (inpatient) 3. HCPCS <p>These codes are mapped to standard vocabulary.</p> <p>If</p> <p>dw_f_conc_noval.concept_id like 'P%' then</p> <p>It is a ICD9(Inpatient) code and need to get the ICD9 in the correct format from the Procedures table:</p> <pre>select SUBSTRING(p.i_icd9, 2, 50) as actual_icd9 from rpdr_19.dbo.Procedures p, rpdr_19.dbo.dw_f_conc_noval 1 offt where p.c_basecode = offt.concept_id</pre> <p>the SUBSTRING function removes Partners proprietary prefix of ICD9 code.</p> <p>Else</p> <p>dw_f_conc_noval.concept_id like 'C%' then</p> <p>It is a CPT or HCPCS code.</p> <pre>select offt.concept_id, SUBSTRING(offt.concept_id, 2, 50) as actual_CPT from rpdr_19.dbo.dw_f_conc_noval offt</pre> <p>the SUBSTRING function removes Partners proprietary prefix of CPT/HCPCS code.</p> <p>To retrieve the OMOP code for the procedure:</p> <p>If it's an ICD9 code:</p>	<p>Phase 1: we only added procedures with CPT codes.</p> <p>We 'clean up' ICD9 and CPT codes to remove a prefix assigned to the code by Partners. For ICD9 codes it's 'p' and for CPT codes it's 'C'.</p> <p>NOTE LMR (PPL) procedure codes will only be represented in the Observation Table as these procedures do not represent time/setting accurately- can be historical information documented on problem list</p>

Destination Field	Source Field	Applied Rule	Comment
		Get corresponding OMOP target_concept_id Else If it's an CPT or HCPCS code Get corresponding OMOPtarget_concept_id	
SOURCE_PROCEDURE_CODE	RPDR_19.dbo.dw_f_conc_noval.concept_id	Actual concept_id from dw_f_conc_noval table	
PROC_OCCUR_TYPE	N/A	Set to 0 since it does not apply	The system that documents the procedure does not reliably reflect the setting where the procedure is performed.

4.1.6 TABLE NAME: OBSERVATION

Observation data extracted from the PHS EMR contains observations that are not included under other categories in the CDM. PHS are: Lab Observations, Problems, Procedures (from Partners dictionary).

There are four principal sources of observations in the PHS EHR data:

- Lab Observations and General Observations for which the results are recorded as numeric values. These are stored in the fact table in RPDR. The different sources are identified by the RPDR base code.
- A person's problem or procedure as recorded in the observation fact table.
- Values for observations are stored in the observation fact table in RPDR as either numeric or text values.
- . All problems are recorded as observations distinct from Condition Occurrences, which are recorded solely based on problem strings mapped to ICD-9-CM diagnosis codes.

Observations from the observation table are mapped to standard observation concepts wherever possible. Lab Observation mapping is as follows:

Destination Field	Source Field	Applied Rule	Comment
OBSERVATION_OCCURRENCE	REQUIRED	System generated unique identifier	

Destination Field	Source Field	Applied Rule	Comment
NCE_ID			
PERSON_ID	REQUIRED	Automatically generated from Person ID in Person Table. Observations for a given patient in the RPDR use this person ID (as defined by the corresponding entry in the Person Table).	
SOURCE_OBSERVATION_CODE	REQUIRED dw_f_conc_noval .concept_id	Same as concept ID in dw_f_conc_noval	
OBSERVATION_CONCEPT_ID	REQUIRED dw_f_conc_noval .concept_id.	Observations in the source RPDR observation fact table (dw_f_conc_noval) are mapped to standard concepts using the OMOP source_to_concept_map mapping table. The matching Concept ID is extracted from the SOURCE_TO_CONCEPT_MAP table using the following rule: Extract TARGET_CONCEPT_ID for - MAPPING_TYPE of 'OBSERVATION' whose source_code matches the corresponding RPDR concept identifier If no matching values found, store the value zero (0).	
OBS_VALUE_AS_NUMBER	Dw_f_conc_noval. nval	Same as numeric value stored in corresponding field (nval) in the RPDR observation fact table (dw_f_conc_noval) for those facts with associated numerical values.	
OBSERVATION_DATE	REQUIRED dw_f_conc_noval _Fact Start Date.	Same as start date in observation fact table (dw_f_conc_noval)	
OBS_RANGE_LOW	OBSERVATION_ LOW_FACT	Low value as defined either in corresponding XML blob in the RPDR observation fact table or as defined in corresponding value in the RPDR lab metadata table for that particular lab test concept ID	
OBS_RANGE_HIGH	OBSERVATION_ HIGH_FACT	High value as defined either in corresponding XML blob in the RPDR observation fact table or as defined in corresponding value in the RPDR lab meta data table for that particular lab test concept ID	
OBSERVATION_TYPE	OBSERVATION_	Populate type code from OBSERVATION_TYPE reference table	Will assess whether we will

Destination Field	Source Field	Applied Rule	Comment
N_TYPE	TYPE	corresponding to Observation Type descriptions: Lab	add BP, Height, Weight later
OBS_VALUE_AS_STRING	Dw_f_conc_noval.tval	Same as string value stored in corresponding field (tval) in the RPDR observation fact table (dw_f_conc_noval) for those facts with associated text values.	
OBS_VALUE_AS_CONCEPT_ID		Null (not applicable)	
OBS_UNITS_CONCEPT_ID	OBSERVATION_FACT.STANDARD_	OMOP Concept ID matching units as defined either in corresponding XML blob in observation fact table or as defined in corresponding value in the lab meta data for that particular lab test concept. These are mapped to the UCUM codes If no matching values found, store the value zero (0).	

Problem mapping:

Destination Field	Source Field	Applied Rule	Comment
OBSERVATION_OCCURRENCE_ID		System generated unique identifier	
PERSON_ID	PATIENT_ID_E	System generated number (as above)	
SOURCE_OBSERVATION_CODE	dbo.dw_f_conc_noval.concept_id	To retrieve the OMOP code for the problem: If it's an LMR (PPL) problem dictionary code: Get target_concept_id from OMOP_source_to_concept_Map table Where source_vocabulary_code = 156 AND Target_vocabulary_code = 04 AND	

Destination Field	Source Field	Applied Rule	Comment
		<p>source_code = PPL code AND</p> <p>(mapping_type = 'PROBLEM" or</p> <p>Mapping_type = 'PROBLEM</p>	
OBSERVATION_CONCEPT_ID	dbo.dw_f_conc_noval.concept_id	<p>See above</p> <p>OBSERVATION_FACT TABLE mapped to a standard concept using a mapping table.</p> <p>Matching Concept ID extracted from the CONCEPT_ID table using the following rule:</p> <p>Extract the CONCEPT_VOCABULARY_CODE and CONCEPT_CODE in the CONCEPT table matching the standard vocabulary and vocabulary code associated with the given Partners Problem ID.</p> <p>The Partners Problem ID will be mapped to a Snomed code (for a standard).</p>	
OBS_VALUE_AS_NUMBER		NULL	
OBSERVATION_DATE	<p>dbo.dw_f_conc_noval.START_DATE</p> <p>(Partners PROBLEM ID_START_Date)</p>	dw.f_conc_noval.start_date	
OBS_RANGE_LOW		NULL	Does not apply to problems
OBS_RANGE_HIGH		NULL	Does not apply to problems
OBSERVATION_TYPE	OBSERVATION_TYPE	Type code from OBSERVATION_TYPE reference table corresponding to Observation Type description 'PROBLEM	
OBS_VALUE_AS_STRING		NULL	Not applicable to PHS

Destination Field	Source Field	Applied Rule	Comment
OBSERVATION_VALUE_AS_CONCEPT_ID		0	Does not apply to problems
OBS_UNITS_CONCEPT_ID		0	Does not apply to problems

Procedure mapping:

Destination Field	Source Field	Applied Rule	Comment
OBSERVATION_OCCURRENCE_ID		System generated unique identifier	
PERSON_ID	PATIENT_ID_E		
SOURCE_OBSERVATION_CODE	dbo.dw_f_conc_noval.concept_id Partners_PROCEDURE_CONCEPT_ID	To retrieve the OMOP code for the problem: If it's an LMR (PPL) procedure dictionary code: Get target_concept_id from OMOP_source_to_concept_Map table Where source_vocabulary_code = 156 AND Target_vocabulary_code = 04 AND source_code = PPL code AND (mapping_type = 'PROCEDURE' or Mapping_type = 'PROCEDURE	
OBSERVATION_CONCEPT_ID	dbo.dw_f_conc_noval.concept_id	See above. OBSERVATION_FACT TABLE mapped to a standard concept using a mapping table. Matching Concept ID extracted from the CONCEPT_ID table using the following rule: Extract the CONCEPT_VOCABULARY_CODE	

Comment [CR1]: What procedures are these?

Destination Field	Source Field	Applied Rule	Comment
		<p>and CONCEPT_CODE in the CONCEPT table matching the standard vocabulary and vocabulary code associated with the given Partners Procedure ID.</p> <p>The Partners Procedure ID will be mapped to a CPT code (for a standard).</p> <p>If no matching values found, store the value zero (0).</p>	
OBS_VALUE_AS_NUMBER		NULL	Does not apply to procedures
OBSERVATION_DATE	<p>dbo.dw_f_conc_noval. START_DATE</p> <p>(Partners PROCEDURE ID_START_Date)</p>	Dw_f_conc_noval.start_date	
OBS_RANGE_LOW		NULL	
OBS_RANGE_HIGH		NULL	
OBSERVATION_TYPE	OBSERVATION_TYPE	Type code from OBSERVATION_TYPE reference table corresponding to Observation Type description "Procedures"	
OBS_VALUE_AS_STRING	TEXT_OBSERVATION.OBS_VALUE	NULL	
OBS_VALUE_AS_CONCEPT_ID		0	
OBS_UNITS_CONCEPT_ID		0	

4.1.7 TABLE NAME: OBSERVATION_PERIOD

Person status during an Observation period in the data is derived from the OBSERVATION_FACT table (dw_f_conc_noval) and the patient dimension table (dw_dim_patient). The observation_start_date and observation_end_date for a given patient is obtained by looking for the earliest and latest fact in the observation fact table. The death status is determined by looking to see if the patient dimension table has the date_of_death field populated. If it does, the patient status concept of “deceased” is used.

Since the patient dimension table only notes a status that semantically corresponds to an OMOP patient status concept when the date_of_death field is populated, in all other instances in which the date_of_death field is not populated the OMOP patient status concept of “other” is used

The field mapping is as follows:

Destination Field	Source Field	Applied Rule	Comment
OBSERVATION_PERIOD_ID		System generated unique identifier	
OBSERVATION_START_DATE	MIN(dw_f_conc_noval.start_date)	This is defined as the earliest fact in the source RPDR observation fact table (dw_f_conc_noval). Thus, for each person, select MIN(start_date) FROM dw_f_conc_noval. PHS does not have enrollment dates	Start date of the Observation period.
OBSERVATION_END_DATE	MAX(dw_f_conc_noval.start_date)	Defined as the latest fact in the source RPDR observation fact table (dw_f_conc_noval). Thus, for each person: SELECT MAX(start_date) FROM dw_f_conc_noval	End date of the observation period.
PERSON_ID	PATIENT_ID_E	person_id from Person Table	
PERSON_STATUS_CONCEPT_ID	dw_dim_patient.date_of_death	IF a death date is recorded in the source RPDR table dw_dim_patient, then use the matching concept id extracted from the source_to_concept_map table using the following rule: If the date_of_death field is populated, the id corresponding to the patient status concept of “deceased” is used. In all other instances the id corresponding to	Death Status will be used from date stored in RPDR

Comment [CR2]: As discussed: If you have the day of death, write an condition_occurrence. If you have only a rough period, put it here.

Destination Field	Source Field	Applied Rule	Comment
		the patient status concept of "other" is used.	
RX_DATA_AVAILABILITY		NULL	

4.2 Partners Data Mapping

Partners data is mapped from the Research Patent Data Registry. As the source data. This data will be transformed into a single set in the CDM, using SQL ETL process to load source file.

4.2.1 TABLE NAME: PERSON

Values for the individual source attributes are mapped to standard concept identifiers in the Dictionary and the corresponding concept identifiers which are stored as attribute values in the CDM PERSON table.

The following transformations apply to PHS data. [Please refer to Person Table](#)

4.2.2 TABLE NAME: DRUG_EXPOSURE

PHS data carry two sources of Drug Exposure information: inpatient charge codes and outpatient charge codes and e-prescribing. Additional Drug Exposure data are inferred based on the person procedures from medical claims data.

4.2.2.1 Transformation from PHS Prescriptions Data

Please refer to Drug Exposure Table for mapping from source to target.

Outpatient e-prescribing carry an entry for initial and subsequent prescriptions each filled prescription and every subsequent refill.

4.2.2.2 Transformation from PHS Procedure Data

Drug Procedure data are primarily captured in the form of procedure codes that capture administration of healthcare services involving a medication. These procedure codes are handled in a variety of ways depending on the underlying details they capture. They include:

- HCPCS Level II codes (i.e., J and Q series codes) that capture medication information, available from Inpatient/Outpatient services data.

- CPT-4 codes that record the administration and management of medications, available from Inpatient/Outpatient services data.
- ICD-9-CM procedure codes that relate to the administration and management of medications, available from Inpatient Admissions and Facility Header data.

Only the subset of procedure codes that offer sufficient specificity necessary for drug concept mapping is included in the Drug Exposure data.

Please refer to drug exposure table for additional detail with regard to table fields (for person ID, drug exposure and source information for drug procedures).

Only procedures which map to a drug concept are extracted.

Note: The field mapping below is valid only for the procedures associated with the Drug concepts.

4.2.3 TABLE NAME: CONDITION_OCCURRENCE

Conditions data are mostly recorded as ICD-9-CM diagnosis codes in various tables. The source of this information is administrative charge data (from inpatient and outpatient systems), This data is submitted charge data.

Please refer to condition occurrence table for transformation of source codes to target.

4.2.4 TABLE NAME: VISIT_OCCURRENCE

Visit occurrences are designed to capture and define every person visit to a healthcare facility. Visit occurrences are classified by mapping them to OMOP generated visit concepts that define the type of healthcare facility associated with the person visit. A single entry is recorded for each visit with the associated dates and concept identifier to define the type of healthcare facility visited.

Extensive details regarding each visit to a healthcare facility are recorded as part of medical claims. The visit related details are stored in Inpatient and Outpatient encounter tables. Please refer to the Visit Occurrence table for detail with regard to the data transformation process for visit codes.

- Inpatient visits are identified thru inpatient charge codes
- Outpatient visits are identified through outpatient charge data
- ED visits are identified through inpatient and outpatient charge data (depending on whether patient was admitted or not).

4.2.5 TABLE NAME: PROCEDURE_OCCURRENCE

Procedure codes are captured in both inpatient and outpatient charge data. Please refer to the Procedure table for a more detailed identification of transformation process.

The procedure codes include CPT codes, ICD CM codes as well as HCPC codes (for medication administration)

4.2.6 TABLE NAME: OBSERVATION

Observation data from PHS includes lab results from the PHS Clinical Data Repository and includes numeric values and units of measure, as well as text lab results. PHS results are mapped to a LOINC metathesaurus.

Only those observations containing standard codes are included in the extraction. Units of measure are also mapped to standard concept identifiers in the dictionary for standardization.

For Field mapping please refer to the Observation Table.

4.2.7 TABLE NAME: OBSERVATION_PERIOD

Patient Status during an Observation Period in the Partners data is derived from evaluating the first and last observation facts (as a marker of activity in the PHS system). PHS does not have access to enrollment or coverage data.

The field mapping is as follows:

Destination Field	Source Field	Applied Rule	Comment
OBSERVATION_PERIOD_ID		System generated unique identifier	
OBSERVATION_START_DATE	MIN(dw_f_conc_noval.start_date)	This is defined as the earliest fact in the source RPDR observation fact table (dw_f_conc_noval). Thus, for each person, select MIN(start_date) FROM dw_f_conc_noval. PHS does not have enrollment dates	Start date of the Observation period (earliest start date of patient activity)
OBSERVATION_END_DATE	MAX(dw_f_conc_noval.start_date)	Defined as the latest fact in the source RPDR observation fact table (dw_f_conc_noval). Thus, for each person: SELECT MAX(start_date) FROM dw_f_conc_noval	End date of the Observation Period.
PERSON_ID		System generated number (as identified in person table)	
PERSON_STATUS_CONCEPT_ID	dw_dim_patient.date_of_death	IF a death date is recorded in the source RPDR table dw_dim_patient, then use the matching concept id extracted from the	Successive entries for a given person status are

Destination Field	Source Field	Applied Rule	Comment
ID		<p>source_to_concept_map table using the following rule:</p> <p>If the date_of_death field is populated, the id corresponding to the patient status concept of "deceased" is used.</p> <p>In all other instances the id corresponding to the patient status concept of "other" is used.</p>	combined into one observation period with the start and end dates defined by both
RX_DATA_AVAILABILITY	[ENROLLMENT_DETAIL].RX	null	Not available for PHS

4.3 Source Independent Data Mapping

The following mapping processes will be performed independent of the source feed.

4.3.1 TABLE NAME: DRUG_ERA

The DRUG_ERA table is constructed through aggregation of individual drug exposures from the DRUG_EXPOSURE table.

4.3.1.1 Transformation of Drug Exposure Data

Construction of Drug Eras starts with extraction of all drug exposure data from the PHS EHR data. Details for the extraction of drug exposure data are captured in the DRUG_EXPOSURE section of this document.

Step 1: The start and end dates for each drug exposure is determined. If the end dates are not available, the following approximations are used:

For Drug Exposures captured from Medication List (DRUG_EXPOSURE_TYPE = 3)
 For END_DATE, use STOP_DATE_TEXT. If this value is NULL, then assume
 STOP_DATE = START_DATE + 30 days

For Drug Exposures captured from Prescriptions Written
 (DRUG_EXPOSURE_TYPE = 2)
 For END_DATE, use START_DATE + (REFILLS + 1) x 30 days
 Note: if refills is null or not populated, a value of 0 is assumed.

For Drug Exposures captured from Prescriptions Dispensed
 (DRUG_EXPOSURE_TYPE = 1)

For END_DATE use START_DATE + DAYS_SUPPLY – SUPPLY DATA
DOES NOT APPLY TO PHS

For Drug Exposures captured from Physician Administered Drug (Identified as Procedure) (DRUG_EXPOSURE_TYPE = 4)
For END_DATE use START_DATE

Step 2: Drug Concept hierarchy levels that would be used to create the Drug Eras are defined as the basis for aggregation of individual drug exposures.

Drug eras are constructed based on RxNorm drug ingredient concepts. Drug exposures are created based on lower level drug concept, or aggregated based on corresponding drug ingredients using drug hierarchy.

The hierarchy level is matched with the CONCEPT_LEVEL attribute in the CONCEPT table in the Dictionary and the resulting concept is named the Ancestor. All lower level Concepts, called Descendants that map to the Ancestor are determined from the CONCEPT_ANCESTOR table.

PHS RPDR drug codes (c_basecodes) are mapped to OMOP concept id's, which in turn are mapped if possible to ancestor id's by looking at those entries in the concept_ancestor table where the descendant_concept_id matches the omop concept id for the PHS RPDR drug code and the ancestor concept id matches a concept in the omop concept table that has a concept level of 2.

For those omop concepts that do not map to an ancestor concept id, the original omop concept id is used in the generation of drug eras.

For those omop concepts that map to more than one ancestor concept id, the original omop concept id is also used in the generation of drug eras.

For those drug codes that do not map to omop identifiers, "surrogate" concept id's are used.

Step 3: The following approach is followed to construct Drug Eras for each setting of Drug concept level and persistence window:

- For each person, Drug exposures are grouped by the Drug Concept and sorted on DRUG_EXPOSURE_START_DATE in ascending order.
- Persistence window defines maximum number of day's gap between periods related to two Drug Exposures in order for them to be aggregated into the same Drug Era. Options are 0 and 30 days persistence window.
- Records are combined together by comparing the start and end dates for the Drug exposures. There are two types of drug exposure that make records valid for the inclusion into era group in order to be considered part of the same era:
 - If the gap between the End Date for one Drug Exposure and the Start Date for the next Drug Exposure is within the persistence window.

- If the End Date for one Drug Exposure is after Start Date of the next Drug Exposure occurrence.
- Start Date for the Drug Era is determined as the minimum Start Date of all the Drug Exposures that comprise of Drug Era range.
- End Date for the Drug Era is determined as the maximum End Date of all the Drug Exposures that comprise of Drug Era range.
- A Drug Exposure Type is applied to all of the Drug Eras based on the setting used for the persistence window; the logic for the Drug Exposure Type is captured in the field mapping below.

All Drug Eras are recorded in the DRUG_ERA table based on the following field mapping:

Destination Field	Source Field	Applied Rule	Comment
DRUG_ERA_ID		System generated unique identifier	
DRUG_ERA_START_DATE	START_DATE	Extracted as the Minimum START_DATE among all the Drug exposures included in the Era	
DRUG_ERA_END_DATE	END_DATE	Extracted as the Maximum END_DATE among all the Drug exposures included in the Era	
PERSON_ID	DRUG_EXPOSURE.PERSON_ID		
DRUG_EXPOSURE_TYPE	DRUG_EXPOSURE_TYPE	<p>The following settings apply:</p> <p>For Eras created with 30 day persistence window setting:</p> <p>DRUG_EXPOSURE_TYPE matching DRUG_EXPOSURE_TYPE_DESC of 'Drug Era – 30 day window'</p> <p>For Eras created with 0 day persistence window setting:</p> <p>DRUG_EXPOSURE_TYPE matching DRUG_EXPOSURE_TYPE_DESC of 'Drug Era – 0 day window'</p>	Drug Exposure Type for the Era created based on the persistence window setting.
DRUG_CONCEPT_ID	DRUG_EXPOSURE_ID.DRUG_CONCEPT_ID	See step 2 above	
DRUG_EXPOS		not populated at this time	

Destination Field	Source Field	Applied Rule	Comment
URE_COUNT			

4.3.2 TABLE NAME: CONDITION_ERA

Condition Era table is constructed through an aggregation of individual Condition Occurrences recorded in the CONDITION OCCURRENCE table.

4.3.2.1 Transformation from Condition Occurrence Data in the CDM

The following steps define the order of constructing CONDITION_ERA table:

Step 1: The start and end dates for each Condition Occurrence is determined. If the end dates are not available, end date is assumed to be equal to start date.

Step 2: Condition Eras will be defined and aggregated based on the same condition concepts associated with the Condition Occurrences.

Step 3: Construct Condition Eras based on the business rules that are set out in the CDM Specifications. The following approach is followed to construct Condition Eras for each setting of condition concept level and persistence window.

- For each person, Condition Occurrences are grouped by the Condition Concept and sorted on CONDITION_START_DATE in ascending order.
- Persistence window defines maximum number of day's gap between periods related to two Condition Occurrences in order for them to be aggregated into the same Condition Era. The options are '0' and '30' day's persistence window.
- Records are aggregated by comparing the start and end dates for the Condition Occurrences. There are two conditions that make records valid for the inclusion into Era group in order to be considered part of the same era:
 - If the gap between the End Date for one Condition Occurrence and the Start Date for the next Condition Occurrence is within the persistence window.
 - If the Start Date for one condition is within the range of the Start/End Date of the next condition occurrence.
- Start Date for the Condition Era is determined as the minimum Start Date of all the Condition Occurrences that comprise a Condition Era range.
- End Date for the Condition Era is determined as the maximum End Date of all the Condition Occurrences that comprise a Condition Era range.
- A Condition Occurrence Type is applied to all of the Condition Eras based on the setting used for the persistence window. The Condition Occurrence types are stored in the CONDITION_OCCURRENCE_REF table.

All Condition Eras are recorded in the CONDITION_ERA table based on the following field mapping:

Destination Field	Source Field	Applied Rule	Comment
CONDITION_ERA_ID		System generated unique identifier	
CONDITION_START_DATE	CONDITION_START_DATE	Extracted as the minimum value of the CONDITION_START_DATE for all the occurrences included in the Condition Era.	
PERSON_ID	CONDITION_OCCURRENCE_PERSON_ID		Unique identifier for the person for whom the Condition Era has been constructed.
CONFIDENCE		NULL	
CONDITION_END_DATE	CONDITION_END_DATE CONDITION_START_DATE	If no End Date is available for the last occurrence, then it is the greatest Start Date or End Date of any occurrence.	
CONDITION_CONCEPT_ID	CONDITION_OCCURRENCE_CONDITION_CONCEPT_ID	If no matching values found, store the value zero (0).	Concept identifier for the Condition concept used to create the Condition Eras. This concept can be the same as the Condition concept related to the individual occurrences or a higher level concept from the Condition concept hierarchy in the vocabulary.
CONDITION_OCCURRENCE_TYPE	CONDITION_OCCURRENCE_TYPE	The following settings apply: For Eras created with 30 day persistence window setting: CONDITION_OCCURRENCE_TYPE matching CONDITION_OCCURRENCE_TYPE_DESC of 'Condition Era – 0 day window' For Eras created with 0 day persistence window setting: CONDITION_OCCURRENCE_TYPE matching CONDITION_OCCURRENCE_TYPE_DESC	Condition Occurrence Type for the Era created based on the persistence window setting.

Destination Field	Source Field	Applied Rule	Comment
		C of 'Condition Era – 30 day window'	
CONDITION_OCCURRENCE_COUNT		Number of individual Condition Occurrences consolidated into the Condition Era	

4.3.3 TABLE NAME: CONDITION_OCCURRENCE_REF

Condition Occurrence Reference table serves as the reference listing of various types of Condition Occurrences recorded for analysis. The Condition Occurrence Type conveys the indicator(s) from which the Condition Occurrence was captured and defines the characteristic of the occurrence and the level of aggregation.

This table is loaded based on a reference list of Occurrence types, descriptions and persistence window settings. The current listing is as follows:

Condition Occurrence Type	Condition Occurrence Type Description	Condition Occurrence Position	Persistence Window (in days)
1	Inpatient Detail	Primary	
2	Inpatient Detail	1	
3	Inpatient Detail	2	
4	Inpatient Detail	3	
5	Inpatient Detail	4	
6	Inpatient Detail	5	
7	Inpatient Detail	6	
8	Inpatient Detail	7	
9	Inpatient Detail	8	
10	Inpatient Detail	9	
11	Inpatient Detail	10	
12	Inpatient Detail	11	
13	Inpatient Detail	12	
14	Inpatient Detail	13	
15	Inpatient Detail	14	
16	Inpatient Detail	15	
17	Inpatient Header	Primary	
18	Inpatient Header	1	

Condition Occurrence Type	Condition Occurrence Type Description	Condition Occurrence Position	Persistence Window (in days)
19	Inpatient Header	2	
20	Inpatient Header	3	
21	Inpatient Header	4	
22	Inpatient Header	5	
23	Inpatient Header	6	
24	Inpatient Header	7	
25	Inpatient Header	8	
26	Inpatient Header	9	
27	Inpatient Header	10	
28	Inpatient Header	11	
29	Inpatient Header	12	
30	Inpatient Header	13	
31	Inpatient Header	14	
32	Inpatient Header	15	
33	Outpatient Detail	1	
34	Outpatient Detail	2	
35	Outpatient Detail	3	
36	Outpatient Detail	4	
37	Outpatient Detail	5	
38	Outpatient Detail	6	
39	Outpatient Detail	7	
40	Outpatient Detail	8	
41	Outpatient Detail	9	
42	Outpatient Detail	10	
43	Outpatient Detail	11	
44	Outpatient Detail	12	
45	Outpatient Detail	13	
46	Outpatient Detail	14	
47	Outpatient Detail	15	

Condition Occurrence Type	Condition Occurrence Type Description	Condition Occurrence Position	Persistence Window (in days)
48	Outpatient Header	1	
49	Outpatient Header	2	
50	Outpatient Header	3	
51	Outpatient Header	4	
52	Outpatient Header	5	
53	Outpatient Header	6	
54	Outpatient Header	7	
55	Outpatient Header	8	
56	Outpatient Header	9	
57	Outpatient Header	10	
58	Outpatient Header	11	
59	Outpatient Header	12	
60	Outpatient Header	13	
61	Outpatient Header	14	
62	Outpatient Header	15	
63	Problem List		
64	Condition Era		0
65	Condition Era		30
66	Death at Discharge		
100	Inpatient Primary Dx		
101	Inpatient Admitting Dx		
102	Inpatient Secondary Dx		
103	Outpatient Primary Dx		
104	Outpatient Admitting Dx		
105	Outpatient Secondary Dx		
106	Outpatient Unknown		
107	Inpatient, unknown Dx type		
108	Unknown setting Primary Dx		

Condition Occurrence Type	Condition Occurrence Type Description	Condition Occurrence Position	Persistence Window (in days)
109	Unknown setting Secondary Dx		
110	Unknown setting, unknown Dx type		
111	Death as Recorded in Patient Dimension Table		

4.3.4 TABLE NAME: PROCEDURE_OCCURRENCE_REF

Procedure Occurrence Reference table serves as the reference listing of various types of Procedure Occurrences recorded for analysis. The Procedure Occurrence Type conveys the indicator(s) from which the Procedure Occurrence was captured, and defines the characteristic of the occurrence.

This table is loaded based on a reference list of occurrence types, position and descriptions. The current listing is as follows:

Procedure Occurrence Type	Procedure Occurrence Type Description	Procedure Occurrence Position
1	Inpatient Detail	Primary
2	Inpatient Detail	1
3	Inpatient Header	Primary
4	Inpatient Header	1
5	Inpatient Header	2
6	Inpatient Header	3
7	Inpatient Header	4
8	Inpatient Header	5
9	Inpatient Header	6
10	Inpatient Header	7
11	Inpatient Header	8
12	Inpatient Header	9
13	Inpatient Header	10
14	Inpatient Header	11
15	Inpatient Header	12

Procedure Occurrence Type	Procedure Occurrence Type Description	Procedure Occurrence Position
16	Inpatient Header	13
17	Inpatient Header	14
18	Inpatient Header	15
19	Outpatient Detail	Primary
20	Outpatient Detail	1
21	Outpatient Header	Primary
21	Outpatient Header	1
22	Outpatient Header	2
23	Outpatient Header	3
24	Outpatient Header	4
25	Outpatient Header	5
26	Outpatient Header	6
27	EHR Order	