****

**Japan Medical Data Center (JMDC)**

**to**

**OMOP Common Data Model (CDM V4.0)**

**ETL Mapping Specification Template**

**Version 4.0**

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# Introduction

This document reflects the requirements, assumptions, business rules and transformations for the Japan Medical Data Center (JMDC) implementation of the Common Data Model Version 4.0 (CDM) as implemented by Janssen.

The purpose of this document is to describe the ETL mapping of the licensed data from JMDC into the OMOP Common Data Model.

Japanese universal multi-payer health-care system covering virtually all citizens was started in 1961. Currently, there are more than 3000 insurers in Japan which may be divided into several main groups. The government‐managed health insurance (kyo-kai-kenpo) consisting of a single (largest) insurer (central government) covers about 35 million people who are workers in small and medium-size enterprises and their dependents. Area-basis public health insurances (koku-min-ken-ko-ho-ken) run by 1,881 municipal governments (e.g., cities, towns and villages) cover 38 million people. Eighty five cooperative insurances (kyo-sai-kumi-a-i) cover 9 million who are mainly civil servants and their dependents. A total of 1,431 Society-Managed Health Insurances (kumi-a-i-sho-kan-ken-ko-ho-ken) cover 29 million who are workers in relatively large enterprises and their dependents. A new scheme starting from 2008 called as “Medical Care System for People Aged 75 and over” run by 47 prefectures covers 15 million old people aged 75 or older.

JMDC database consists of data from 60 Society-Managed Health Insurances covering workers aged 18 to 65 and their dependents (children younger than 18 years old and elderly people older than 65 years old). The old people (particularly those aged 66 or older) are less representative as compared with whole population in the nation. When estimated among the people who are younger than 66 years old, the proportion of children younger than 18 years old in JMDC is approximately the same as the proportion in the whole nation. JMDC data includes data on membership status of the insured people and claims data provided by insurers under contract. Claims data are derived from monthly claims issued by clinics, hospitals and community pharmacies. The number of claims issued and added to JMDC database is about 800,000 per month. The size of JMDC population is 1.9 million, 1.5% of about 120 million people in the whole nation. A total of 60 insurances may be classified by data period as follows:

<data period> <N of insurances> <Start year>

10 years 4 2005

7 years 5 2008

6 years 16 2009

5 years 7 2010

4 years 11 2009 or 2011

3 years 7 2009 or 2012

2 years 4 2009 to 2013

1 year 5 2009 (one year)

This document is based on the OMOP ETL Specifications. General information that is covered by the OMOP ETL Specification will not be covered in this document, but a detailed discussion of the JMDC specific aspects of mapping and converting data to the standard CDM is provided.

The document is composed of two main sections:

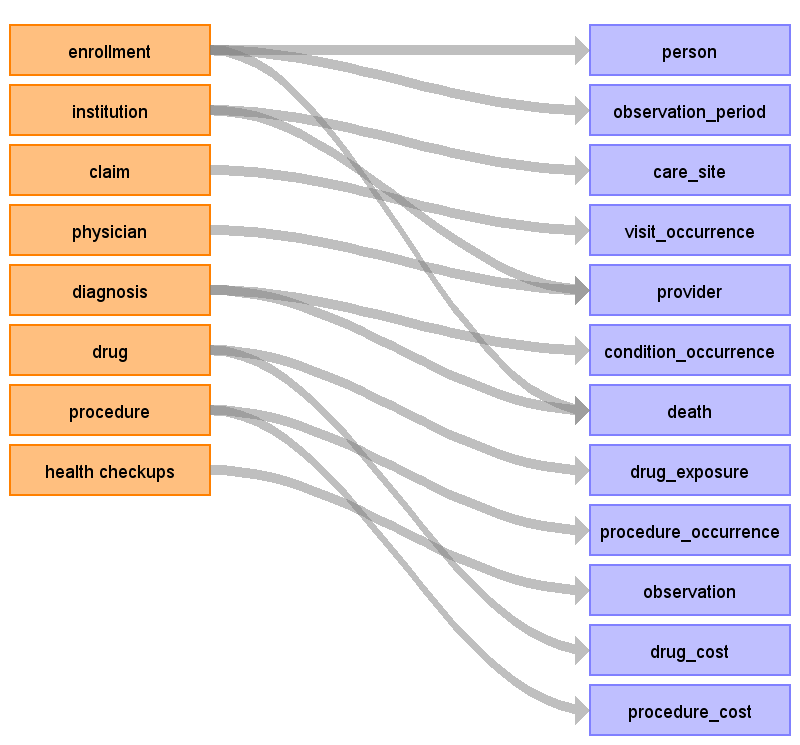
* Source Data Mapping. Describes major tables of the CDM schema and special data handling required for each table.
* Source Independent Data Mapping. Describes mapping process of the Drug and Condition Era’s..

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 researchers that want to use the experience and learning in order to incorporate them into their own CDM construction.

# Source Data Mapping Approach

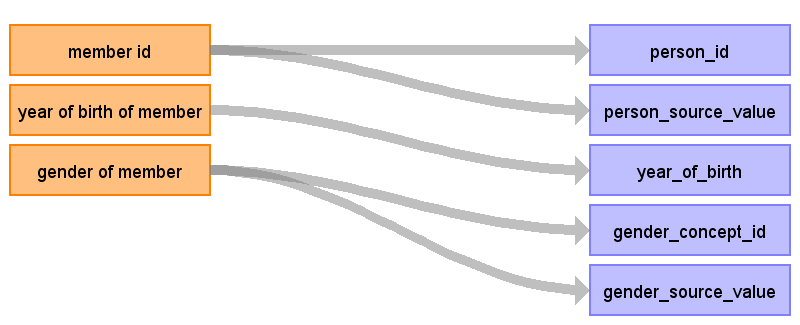
The figure below represents the general approach to mapping the source data tables that are available in JMDC to the CDM data schema. The orange boxes represent the input tables in JMDC and the blue boxes represent the resulting CDM tables.



## Data Mapping

### Table Name: PERSON

Reading from enrollment

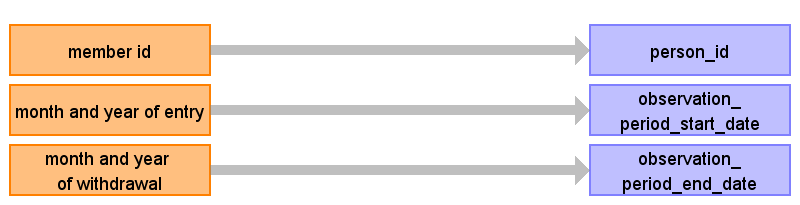


|  |  |  |  |
| --- | --- | --- | --- |
| Destination Field | Source Field | Logic | Comment |
| person\_id | member id | Remove 'B' prefix |  |
| person\_source\_value | member id |  |  |
| year\_of\_birth | year of birth of member |  |  |
| gender\_concept\_id | gender of member | male = 8507 female = 8532 |  |
| month\_of\_birth |  |  |  |
| day\_of\_birth |  |  |  |
| race\_concept\_id |  |  |  |
| ethnicity\_concept\_id |  |  |  |
| location\_id |  |  |  |
| provider\_id |  |  |  |
| care\_site\_id |  |  |  |
| gender\_source\_value | gender of member |  |  |
| race\_source\_value |  |  |  |
| ethnicity\_source\_value |  |  |  |

### Table Name: OBSERVATION\_PERIOD

Observation period start date is the max of ‘month and year of entry’ field for the patient and the first claim date for all patients in the claim file. Observation period end date is the min of the ‘month and year of withdrawal’ for the patient and the last claim date found in the claim file for all patients. Delete any patients without observation time (observation period end date-observation period start date<=0).

Reading from enrollment



|  |  |  |  |
| --- | --- | --- | --- |
| Destination Field | Source Field | Logic | Comment |
| observation\_period\_id |  |  | Autogenerate |
| person\_id | member id | Remove 'B' prefix |  |
| observation\_period\_start\_date | month and year of entry | Take the max of month and year of entry, and the database start month. Database start month can be found using: SELECT MIN([Month and year of medical care]) FROM [Claim]. Set date to 1st of the month. |  |
| observation\_period\_end\_date | month and year of withdrawal | Take the min of month and year of withdrawal, and the database end month. Database end month can be found using: SELECT MAX([Month and year of medical care]) FROM [Claim]. Set date to end of selected month. |  |

### Table Name: CARE\_SITE

Reading from institution

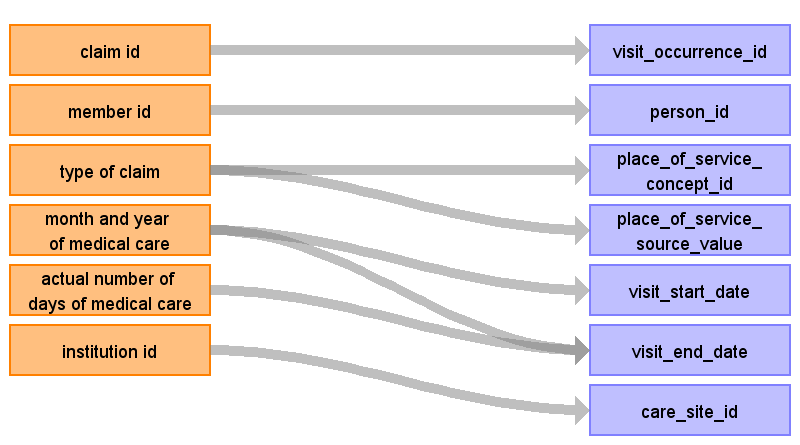


|  |  |  |  |
| --- | --- | --- | --- |
| Destination Field | Source Field | Logic | Comment |
| care\_site\_id | institution id |  |  |
| location\_id |  |  |  |
| organization\_id |  |  |  |
| place\_of\_service\_concept\_id |  |  |  |
| care\_site\_source\_value | institution id |  |  |
| place\_of\_service\_source\_value |  |  |  |

### Table Name: VISIT\_OCCURRENCE

Each unique claim id for a patient will be assigned to a visit. In claims only the year + month is provided, day information is not available. However, oftentimes a claim will be associated with a piece of information that does have a specific date. Specific dates can come from prescription date, procedure date, admission date, discharge date, or the start of medical care date. This information will be used to infer the visit date with more precision. (e.g. if it’s a 2 day visit, and it has a procedure taking place on the 20th, we might assume the visit starts on the 20th). If no specific date is available, we will assume the visit start and any events associated with the visit fall on the 15th of the month. We choose the middle of the month because accidental reversal of temporality (where the order of events is switched because one piece of information did have a date, and another didn’t) is just as likely to occur in one direction as the other.

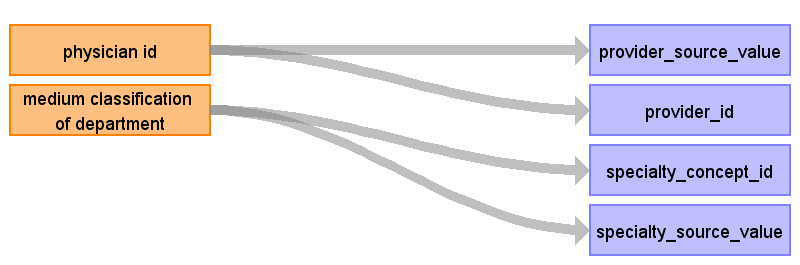
Reading from claim



|  |  |  |  |
| --- | --- | --- | --- |
| Destination Field | Source Field | Logic | Comment |
| visit\_occurrence\_id | claim id |  |  |
| person\_id | member id | Remove 'B' prefix |  |
| place\_of\_service\_concept\_id | type of claim | DPC and inpatient 9201 Outpatient and Pharmacy 9202 |  |
| place\_of\_service\_source\_value | type of claim |  |  |
| visit\_start\_date | month and year of medical care | If a claim is associated with a Diagnosis that has an admission date, set the visit\_start\_date to the max of the admission date and the first of the month of medical care.  If the claim is associated with a Drug.[Prescription date] or Procedure.[Procedure date], use the minimum of those dates as the visit\_start\_date.  If the claim is associated with a diagnosis, and (1) that [Diagnosis].[Month and year of start of medical care] date falls within the [Month and year of medical care] and (2) there is no other diagnoses with the same level 4 ICD-10 code from the same institution for the same member with the same [Month and year of start of medical care] date, then the [Month and year of start of medical care] date is used as the visit\_start\_date.  Else assume the visit started on the 15th of the [month and year of medical care]. |  |
| visit\_end\_date | actual number of days of medical care month and year of medical care | Compute as visit\_start\_date + number of days of medical care |  |
| care\_site\_id | institution id |  |  |

### Table Name: PROVIDER

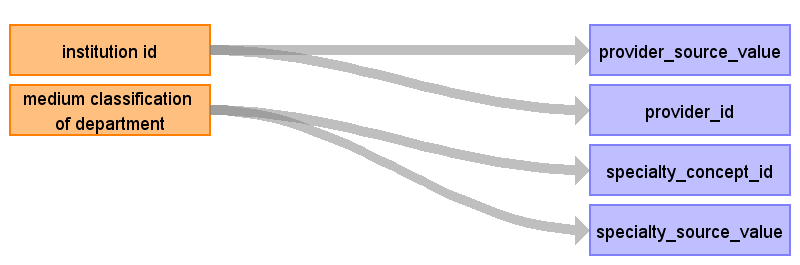
Reading from physician



|  |  |  |  |
| --- | --- | --- | --- |
| Destination Field | Source Field | Logic | Comment |
| provider\_source\_value | physician id |  |  |
| provider\_id | physician id |  | Note that physician IDs and institution IDs are already unique (no collisions). |
| npi |  |  |  |
| dea |  |  |  |
| specialty\_concept\_id | medium classification of department |  | Use provided mapping |
| specialty\_source\_value | medium classification of department |  |  |
| care\_site\_id |  |  | When mapping from institution, this is the case\_site\_id corresponding to that institution. |

Reading from institution

We create a dummy provider for every institution, so we can at least capture specialty for diagnoses and procedures (which are mapped to institution, but not to physician).



|  |  |  |  |
| --- | --- | --- | --- |
| Destination Field | Source Field | Logic | Comment |
| provider\_source\_value | institution id |  |  |
| provider\_id | institution id |  | Note that physician IDs and institution IDs are already unique (no collisions). |
| npi |  |  |  |
| dea |  |  |  |
| specialty\_concept\_id | medium classification of department |  | Use mapping table |
| specialty\_source\_value | medium classification of department |  |  |
| care\_site\_id |  |  | When mapping from institution, this is the case\_site\_id corresponding to that institution. |

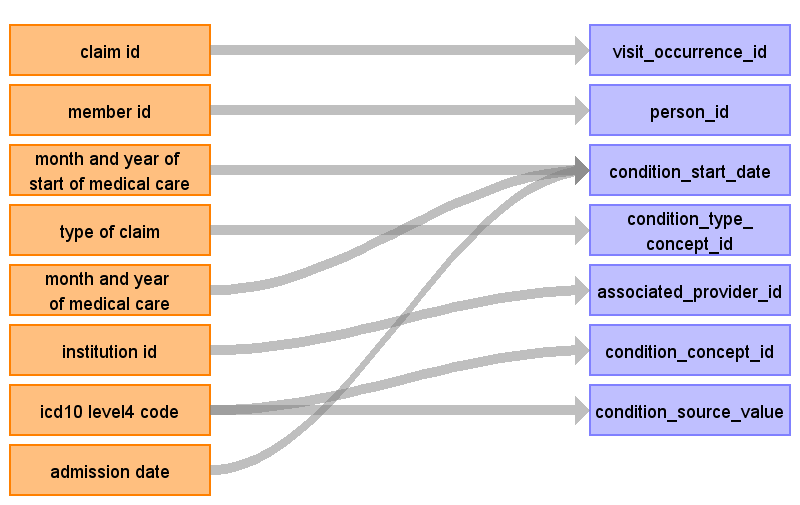
### Table Name: CONDITION\_OCCURRENCE

Two types of conditions will be captured in JMDC: (1) ICD-10 diagnoses with start dates of the associated visit (see visit\_occurrence section for how these are determined), and (2) ICD-10 diagnoses with start dates of the ‘month and year of start of medical care’. This second type of condition record can be considered to be a ‘condition era’ type record, as the condition start date will in some cases be the actual start of the condition as opposed to a service date related to the condition. See mapping table below for specific logic.

This condition-era type record is possible because in Japanese claims, the “Month and year of start of medical care” is specified for almost all conditions and is the first day when that hospital/clinic started to provide health-care service for that condition. This date can be very old (e.g., decades ago).

The “Month and year of start of medical care” is often the date of true occurrence of the condition though the date can be later than the true occurrence date as a new start date will be created if the patient is referred to a different clinic/hospital. Even in the same clinic/hospital, a new start date may be given to the same condition of the same patient because of several reasons. For instance, if the patient had an acute condition again after the recovery from the previous same acute condition, a new start date may be created as two episodes were judged independent. Even for the chronic condition, a new start date may be created if the service has not been given for certain period (e.g., more than several months). The latter may occur according to the policy of handling patient’s conditions which may differ between clinics/hospitals. A new start date may also be created from an administrative view (e.g., the service fee for a new condition is a little higher than that for an old condition).

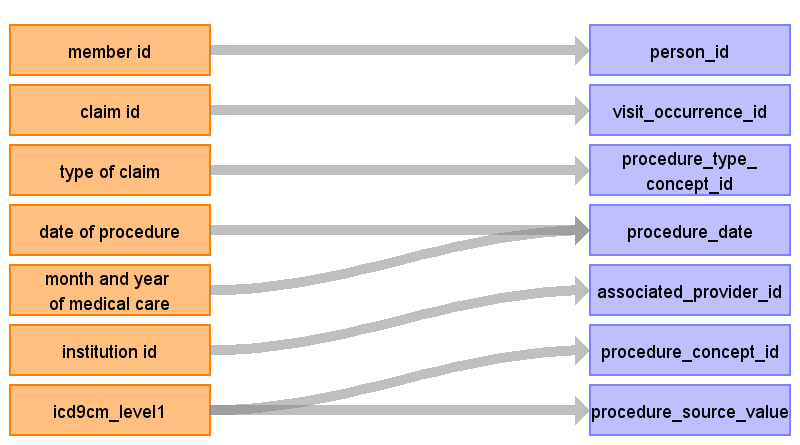
Reading from diagnosis



|  |  |  |  |
| --- | --- | --- | --- |
| Destination Field | Source Field | Logic | Comment |
| visit\_occurrence\_id | claim id |  |  |
| person\_id | member id | Remove 'B' prefix |  |
| condition\_occurrence\_id |  |  | autogenerated |
| condition\_start\_date | month and year of medical care admission date month and year of start of medical care | Use admission date when populated, otherwise use start of visit.  Create additional condition occurrences (condition 'eras') if [Month and year of start of medical care] is earlier than [Month and year of medical care]. If [Month and year of start of medical care] indicates a month where there is another diagnosis from the same [Institution ID] with the same [icd10 level4 code], assume that condition 'era' starts on that date. Else assume the start is the 15th of the [Month and year of start of medical care]. If [Month and year of start of medical care] precedes the observation\_period\_start date, set to observation\_period\_start\_date. |  |
| condition\_end\_date |  | For condition era type records, the end date should be the end of the last diagnosis for that patient that has the specific [Month and year of start of medical care], [Institution ID], and [icd10 level4 code], for all other records set to null |  |
| condition\_type\_concept\_id | type of claim | out-patient: 38000215 (Outpatient detail - 1st position) in-patient or DPC: 38000184 (Inpatient detail - 1st position)  condition-era type record 38000246 (Condition era - 0 days persistence window) |  |
| stop\_reason |  |  |  |
| associated\_provider\_id | institution id |  | Use dummy provider corresponding to the institute |
| condition\_concept\_id | icd10 level4 code |  | Use condition code mapping |
| condition\_source\_value | icd10 level4 code |  |  |

### Table Name: PROCEDURE\_OCCURRENCE

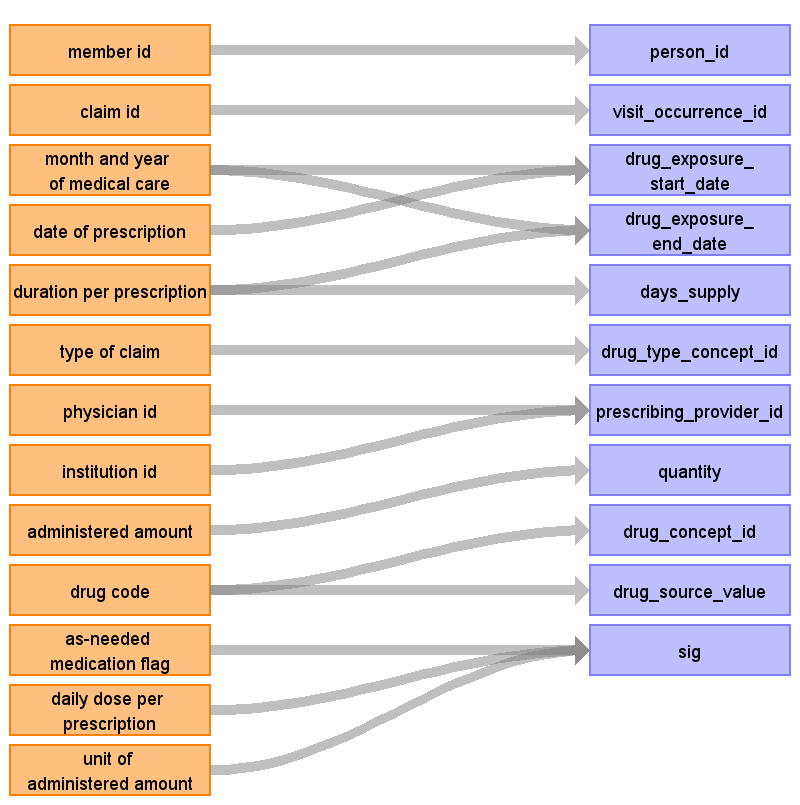
Reading from procedure



|  |  |  |  |
| --- | --- | --- | --- |
| Destination Field | Source Field | Logic | Comment |
| person\_id | member id | Remove 'B' prefix |  |
| visit\_occurrence\_id | claim id |  |  |
| procedure\_occurrence\_id |  |  | autogenerated |
| procedure\_type\_concept\_id | type of claim | out-patient: 38000267 (Outpatient detail - 1st position) in-patient or DPC: 38000249 (Inpatient detail - 1st position) |  |
| procedure\_date | date of procedure month and year of medical care | Use date of procedure when populated, otherwise use start of visit |  |
| associated\_provider\_id | institution id |  | Use the dummy providers we created per institution |
| procedure\_concept\_id | icd9cm\_level1 |  | Use ICD9 procedure code mapping |
| procedure\_source\_value | icd9cm\_level1 |  |  |
| relevant\_condition\_concept\_id |  |  |  |

### Table Name: DRUG\_EXPOSURE

Reading from drug



|  |  |  |  |
| --- | --- | --- | --- |
| Destination Field | Source Field | Logic | Comment |
| person\_id | member id | Remove 'B' prefix |  |
| visit\_occurrence\_id | claim id |  |  |
| drug\_exposure\_start\_date | month and year of medical care date of prescription | Use date of prescription if available, otherwise set to start of visit. |  |
| drug\_exposure\_end\_date | duration per prescription month and year of medical care | Drug\_exposure\_end\_date = drug\_exposure\_start\_date + min([Duration per prescription],180) |  |
| days\_supply | duration per prescription | If value > 180, set to 180 (occurs in 74 prescriptions) |  |
| drug\_type\_concept\_id | type of claim | pharmacy, out-patient: 38000175 (Prescription dispensed in pharmacy) in-patient or DPC: 38000180 (Inpatient administration) |  |
| prescribing\_provider\_id | physician id institution id | If physician is not provided, use the dummy providers we created per institution. |  |
| quantity | administered amount |  |  |
| drug\_concept\_id | drug code | Look up in drug mapping |  |
| drug\_source\_value | drug code |  |  |
| sig | as-needed medication flag daily dose per prescription unit of administered amount |  | Combine the three fields to create a sig string |
| stop\_reason |  |  |  |
| refills |  |  |  |
| relevant\_condition\_concept\_id |  |  |  |
| drug\_exposure\_id |  |  | autogenerate |

### Table Name: DEATH

There are two sources of death status: enrollment and the diagnosis table. To make sure we have at most one death per person, when there are multiple death records per person, we will take the latest from diagnose if available, else the date from enrollment. The reason for this is that the date from diagnosis might be specific to date, whereas the information from enrollment status is always at the month level and therefore assumed to be at the end of the month.

Reading from enrollment

If death flag = 1, create a row in the death table for that person, using the end of enrollment as the death date.



|  |  |  |  |
| --- | --- | --- | --- |
| Destination Field | Source Field | Logic | Comment |
| person\_id | member id | Remove 'B' prefix |  |
| death\_date | month and year of withdrawal | Set death date to last day of [Month and year of withdrawal] |  |
| death\_type\_concept\_id |  |  | From enrollment: 38003565 (Payer enrollment status "Deceased") From diagnosis: 38003567 (Medical claim diagnostic code indicating death) |
| cause\_of\_death\_concept\_id |  |  |  |
| cause\_of\_death\_source\_value |  |  |  |

Reading from diagnosis

When outcome = 2 (dead), create a row in the death table with date of death = end of visit date. We need to look up that date in the visit\_occurrence table using the claim ID (= visit\_occurrence\_id).



|  |  |  |  |
| --- | --- | --- | --- |
| Destination Field | Source Field | Logic | Comment |
| person\_id | member id | Remove 'B' prefix |  |
| death\_date | month and year of medical care | Use end of visit/claim date |  |
| death\_type\_concept\_id |  |  | From enrollment: 38003565 (Payer enrollment status "Deceased") From diagnosis: 38003567 (Medical claim diagnostic code indicating death) |
| cause\_of\_death\_concept\_id |  |  |  |
| cause\_of\_death\_source\_value |  |  |  |

### Table Name: OBSERVATION

Reading from health checkups

|  |  |  |  |
| --- | --- | --- | --- |
| Destination Field | Source Field | Logic | Comment |
| person\_id | member id | Remove 'B' prefix |  |
| observation\_id |  |  | autogenerated |
| observation\_date | Month and year of health chechups | Set to 15th of the month |  |
| observation\_type\_concept\_id |  |  | 38000277 (Lab observation with numeric result) for continuous fields 38000279 (Lab observation concept code result) for ECG 900000004 (Observation text) for ophthalmoscopies '44814721' (Patient Reported) for Smoking ... Sleeping |
| observation\_time |  |  |  |
| value\_as\_number | Bmi, amount of visceral fat, abdominal girth, sbp, dbp, tc, tg, hdl c, ldl c, gpt, g gt, casual blood sugar, fasting blood sugar, hba1c, urine sugar, urine protein, hematocrit, hemoglobin, red blood cell count, serum uric acid, serum creatinine |  |  |
| value\_as\_concept\_id |  |  | From mapping for ECG, Smoking, and sleeping |
| observation\_concept\_id | Bmi, amount of visceral fat, abdominal girth, sbp, dbp, tc, tg, hdl c, ldl c, gpt, g gt, casual blood sugar, fasting blood sugar, hba1c, urine sugar, urine protein, hematocrit, hemoglobin, red blood cell count, serum uric acid, serum creatinine, electrocardiogram, ophthalmoscopy k w classification, ophthalmoscopy scheie classifica, ophthalmoscopy scheie classific0 ,ophthalmoscopy scott classificat, smoking habits, eating habit 1, eating habit 2, eating habit 3, eating habit 4, drinking habits, sleeping |  | From mapping |
| unit\_concept\_id |  |  | From mapping |
| unit\_source\_value |  |  | Take from data dictionary |
| range\_low |  |  | Take from reference file |
| range\_high |  |  | Take from reference file |
| associated\_provider\_id |  |  |  |
| visit\_occurrence\_id |  |  |  |
| relevant\_condition\_concept\_id |  |  |  |
| observation\_source\_value | Bmi, amount of visceral fat, abdominal girth, sbp, dbp, tc, tg, hdl c, ldl c, gpt, g gt, casual blood sugar, fasting blood sugar, hba1c, urine sugar, urine protein, hematocrit, hemoglobin, red blood cell count, serum uric acid, serum creatinine, electrocardiogram, ophthalmoscopy k w classification, ophthalmoscopy scheie classifica, ophthalmoscopy scheie classific0 ,ophthalmoscopy scott classificat, smoking habits, eating habit 1, eating habit 2, eating habit 3, eating habit 4, drinking habits, sleeping |  |  |
| value\_as\_string | electrocardiogram, ophthalmoscopy k w classification, ophthalmoscopy scheie classifica, ophthalmoscopy scheie classific0 ,ophthalmoscopy scott classificat, smoking habits, eating habit 1, eating habit 2, eating habit 3, eating habit 4, drinking habits, sleeping |  |  |

### Table Name: DRUG\_COST



|  |  |  |  |
| --- | --- | --- | --- |
| Destination Field | Source Field | Logic | Comment |
| drug\_cost\_id |  |  | autogenerate |
| drug\_exposure\_id |  |  | Look up in drug\_exposure table corresponding to this row in the [Drug] table |
| paid\_copay |  |  |  |
| paid\_coinsurance |  |  |  |
| paid\_toward\_deductible |  |  |  |
| paid\_by\_payer |  |  |  |
| paid\_by\_coordination\_benefits |  |  |  |
| total\_out\_of\_pocket |  |  |  |
| total\_paid | actual point |  | 1 point = 10 yen |
| ingredient\_cost |  |  |  |
| dispensing\_fee |  |  |  |
| average\_wholesale\_price |  |  |  |
| payer\_plan\_period\_id |  |  |  |

### Table Name: PROCEDURE\_COST

Reading from procedure



|  |  |  |  |
| --- | --- | --- | --- |
| Destination Field | Source Field | Logic | Comment |
| procedure\_cost\_id |  |  | autogenerate |
| procedure\_occurrence\_id |  |  | Look up in procedure\_occurrence table in record corresponding to this row in the [Procedure] table. |
| paid\_copay |  |  |  |
| paid\_coinsurance |  |  |  |
| paid\_toward\_deductible |  |  |  |
| paid\_by\_payer |  |  |  |
| paid\_by\_coordination\_benefits |  |  |  |
| total\_out\_of\_pocket |  |  |  |
| total\_paid | actual point |  | 1 point = 10 yen |
| disease\_class\_concept\_id |  |  |  |
| revenue\_code\_concept\_id |  |  |  |
| payer\_plan\_period\_id |  |  |  |
| disease\_class\_source\_value |  |  |  |
| revenue\_code\_source\_value |  |  |  |

## Source Independent Data Mapping

### Table Name: DRUG\_ERA

The DRUG\_ERA table is defined as a span of time when a person is assumed to be using a particular drug. Successive periods of such drug exposure may be combined to produce one continuous drug era. The DRUG\_ERA table is populated from the DRUG\_EXPOSURE table within the CDM. Drug eras are consolidated to their respective ingredient off the DRUG\_EXPOSURE table, eliminating all information about strength and administration route. A drug era is therefore understood as exposure to a certain compound over a certain period of time. There will only be one type of persistence window (duration that is allowed to elapse between drug exposures) applied to this CDM, which is 30 days.

| **Destination Field** | **Source Field** | **Applied Rule** | **Comment** |
| --- | --- | --- | --- |
| DRUG\_ERA\_ID |  | System Generated |  |
| PERSON\_ID | PERSON\_ID |  |  |
| DRUG\_CONCEPT\_ID | DRUG\_CONCEPT\_ID | Do not create DRUG\_ERAs where the DRUG\_EXPOSURE.DRUG\_CONCEPT\_ID is 0.  Use the map below to map DRUG\_EXPOSURE.DRUG\_CONCEPT\_ID to the ingredient level DRUG\_CONCEPT\_ID used in the DRUG\_ERA. |  |
| DRUG\_ERA\_START\_DATE | DRUG\_EXPOSURE\_START\_DATE |  |  |
| DRUG\_ERA\_END\_DATE | Drug\_exposure\_end\_date |  |  |
| DRUG\_TYPE\_CONCEPT\_ID |  | Apply a 30 day persistence window and label as CONCEPT\_ID 38000182 (Drug era - 30 days persistence window). | Falls under CONCEPT\_VOCABULARY\_ID = 36 - Drug Exposure Type. |
| DRUG\_EXPOSURE\_COUNT |  | Sum up the number of DRUG\_EXPOSURES for this PERSON\_ID and this CONCEPT\_ID during the exposure window being built. |  |

### Table Name: CONDITION\_ERA

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

| **Destination Field** | **Source Field** | **Applied Rule** | **Comment** |
| --- | --- | --- | --- |
| CONDITION\_ERA\_ID |  | System Generated |  |
| PERSON\_ID | PERSON\_ID |  |  |
| CONDITION\_CONCEPT\_ID | CONDITION\_CONCEPT\_ID | Do not build CONDITION\_ERAS where the CONDITION\_OCCURRENCE.CONDITION\_CONCEPT\_ID is 0. |  |
| CONDITION\_ERA\_START\_DATE | CONDITION\_START\_DATE |  | The start date for the condition era constructed from the individual instances of condition occurrences. It is the start date of the very first chronologically recorded instance of the condition. |
| CONDITION\_ERA\_END\_DATE | CONDITION\_END\_DATE |  | The end date for the condition era constructed from the individual instances of condition occurrences. It is the end date of the final continuously recorded instance of the condition. |
| CONDITION\_TYPE\_CONCEPT\_ID | - | Apply a 30 day persistence window and label as CONCEPT\_ID 38000247 (Condition era - 30 days persistence window). | Falls under CONCEPT\_VOCABULARY\_ID = 37 - OMOP Condition Occurrence Type. |
| CONDITION\_OCCURRENCE\_COUNT | - | Sum up the number of CONDITION\_OCCURRENCEs for this PERSON\_ID and this CONCEPT\_ID during the exposure window being built. |  |

# Appendices

## Source Code Mappings

### Drug mapping

A drug map was automatically constructed based on the data available in the Drug table. The process is described in this document:



The table below shows how many codes were mapped to the various levels of the OMOP Vocabulary drug hierarchy. Also shown is the number of prescriptions this entails in the JMDC Drug table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **concept\_class** | **code\_count** | **code\_percent** | **prescription\_count** | **precription\_percent** |
| Branded Drug | 398 | 2% | 12,955,933 | 7% |
| Clinical Drug | 6,183 | 30% | 52,058,338 | 30% |
| Ingredient | 9,332 | 45% | 75,939,700 | 43% |
| ATC | 4,639 | 23% | 34,616,311 | 20% |



### Condition mapping

The ICD-10 conditions codes were automatically mapped to SNOMED using the OMOP Vocabulary. Because the mapping in the Vocabulary V4 is not very good, we used the mapping from the upcoming OMOP Vocabulary V5.



### Procedure mapping

ICD-9 procedure codes were mapped to OMOP concepts using the OMOP Vocabulary.



### Specialty mapping

Specialties were manually mapped from the values of the ‘Medium classification of department’ fields to OMOP Specialty concepts.



### Measurement mapping

Measurements as found in the ‘Health checkups’ table were manually mapped to LOINC concepts, and units were mapped to UCUM concepts.

