



# Get OMOP Fit: Exercises for Healthy OMOP Code

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12 September 2024

# Is this your first time hearing about OMOP?



If so, have we got some great resources for you to get started with...

## Documentation

- [OMOP OHDSI Resources](#)
- [VINCI OMOP Academy](#)
- [VA CIPHER Wiki:OMOP](#)

## Help Desk Contact

- OMOP Help Desk at [VINCI@va.gov](mailto:VINCI@va.gov);  
use subject "OMOP"

# Today's topics – in-database SQL resources for OMOP



1. Doing the heavy lifting: OMOP TVFs
2. Cross-training with Patient Map tables
3. Strengthening your Concept Relationships
4. Secrets to well-defined (L)abs
5. Other tips for top OMOP form





# Section 1:

## Doing the heavy lifting: OMOP TVFs

# What even IS a TVF? Why do you need one?

§1



**TVFs: Search Engines For OMOP**



**By OMOP Users, For OMOP Users**



**Make Research Reproducible**

RB02/RB03 > CDWork + Research Databases >

- [-] Programmability
  - [+] Stored Procedures
  - [-] Functions
    - [-] **Table-valued Functions (filtered)**
      - [+] Src.OMOPV5\_tvf\_D01\_GetDrugConceptByID
      - [+] Src.OMOPV5\_tvf\_D02\_GetDrugOrDrugClassByKeyword
      - [+] Src.OMOPV5\_tvf\_D03\_GetDrugIngredientsByID
      - [+] Src.OMOPV5\_tvf\_D04\_GetDrugsByIngredientID
      - [+] Src.OMOPV5\_tvf\_D05\_GetGenericDrugsByIngredient
      - [+] Src.OMOPV5\_tvf\_D06\_GetBrandedDrugsByIngredient
      - [+] Src.OMOPV5\_tvf\_D07\_GetSingleIngredientDrugsByIngredient
      - [+] Src.OMOPV5\_tvf\_D08\_GetDrugClassesForDrugOrIngredient
      - [+] Src.OMOPV5\_tvf\_D09\_GetDrugsByDrugClass
      - [+] Src.OMOPV5\_tvf\_D10\_GetIngredientByDrugClass
      - [+] Src.OMOPV5\_tvf\_D11\_GetSourceCodesByDrugClass
      - [+] Src.OMOPV5\_tvf\_D20\_GetDoseFormOfADrug
      - [+] Src.OMOPV5\_tvf\_D21\_GetRouteOfAdministrationOfADrug
      - [+] Src.OMOPV5\_tvf\_D25\_GetGenericDrugsFromAListOfDrugs
      - [+] Src.OMOPV5\_tvf\_D28\_GetDrugStrength
      - [+] Src.OMOPV5\_tvf\_G17\_GetStatisticsAboutDrugsMappingOfSourceVocabularies
      - [+] Src.OMOPV5\_tvf\_P04\_GetProceduresUsedForDrugAdministration



## Learn...

- Drug ingredients, types, mappings, and classes
- Condition synonyms
- OMOP representations for local concepts

## Create...

- **Filters** from study drugs, conditions, or procedures
- Sensible **concept sets** for drugs and conditions
- Durable and reusable **cohort definitions**



# Example: What concepts exist for Thyrogen?

§1



## TVF\_D02\_GetDrugOrDrugClassByKeyword (TextName, Date)

*Finds Drug & Drug Class Names by keyword search*

```
SELECT top 10 * FROM [Src].[OMOPV5_tvf_D02_GetDrugOrDrugClassByKeyword] ('Thyrogen',null)
```

100 %

Results Messages

	Entity_concept_id	Entity_name	Entity_code	Entity_type	Entity_concept_class_id	Entity_vocabulary_id	Entity_vocabulary_name
1	40149615	Glycoprotein Homones, alpha Subunit 0.92 MG/ML ...	791484	Concept	Branded Drug Comp	RxNorm	RxNorm (NLM)
2	40126315	thyrotropin alfa (USP) Injectable Solution [Thyrogen]	578224	Concept	Branded Drug Fom	RxNorm	RxNorm (NLM)
3	40149614	Glycoprotein Homones, alpha Subunit 0.92 MG/ML ...	791485	Concept	Branded Drug	RxNorm	RxNorm (NLM)
4	35603618	thyrotropin alfa 1.1 MG [Thyrogen]	1724317	Concept	Branded Drug Comp	RxNorm	RxNorm (NLM)
5	35603619	thyrotropin alfa Injection [Thyrogen]	1724318	Concept	Branded Drug Fom	RxNorm	RxNorm (NLM)
6	1537567	{2 (thyrotropin alfa 0.9 MG Injection [Thyrogen]) } Pa...	2554805	Concept	Branded Pack	RxNorm	RxNorm (NLM)
7	789778	thyrotropin alfa 1.1 MG Injection [Thyrogen]	2166578	Concept	Branded Drug	RxNorm	RxNorm (NLM)
8	789774	Thyrogen	2166574	Concept	Brand Name	RxNorm	RxNorm (NLM)
9	36230793	Thyrogen Injectable Product	1177893	Concept	Branded Dose Group	RxNorm	RxNorm (NLM)
10	1537047	thyrotropin alfa 0.9 MG Injection [Thyrogen]	2554804	Concept	Branded Drug	RxNorm	RxNorm (NLM)

# Example: What's the main ingredient of Thyrogen?

§1



## TVF\_D03\_GetDrugIngredientsByID (DrugID, Date)

*Finds the underlying drug ingredients (and CONCEPT\_IDs) for the supplied drug CONCEPT\_ID*

```
6 SELECT * FROM [Src].[OMOPV5_tvf_D03_GetDrugIngredientsByID](1537567,null)
7
8
```

100 %

Results Messages

	Drug_concept_id	Drug_name	Drug_concept_code	Drug_concept_class_ID	Ingredient_concept_id	Ingredient_name	Ingredient_concept_code	Ingredient_concept_class_ID
1	1537567	{2 (thyrotropin alfa 0.9 MG Injection [Thyroge...	2554805	Branded Pack	19063297	thyrotropin alfa	4952	Ingredient



# Example: What drug classes is thyrotropin alfa in?

§1



## TVF\_D08\_GetDrugClassesForDrugOrIngredient (Drug/IngredientID, Date)

*Finds all parent drug classes for the supplied Drug CONCEPT\_ID or Drug Ingredient CONCEPT\_ID*

```
13 SELECT * FROM [Src].[OMOPV5_tvf_D08_GetDrugClassesForDrugOrIngredient] ('19063297', null)
14
```

100 %

Results Messages

	Class_concept_id	Class_name	Class_code	Classification_id	Class_vocabulary_id	Class_vocabulary_name	Levels_of_separation
1	21605297	OTHER DIAGNOSTIC AGENTS	V04C	ATC 3rd	ATC	WHO Anatomic Therapeutic Chemical Classification	2
2	21602683	ANTERIOR PITUITARY LOBE HORMONES AND ANALOGUES	H01A	ATC 3rd	ATC	WHO Anatomic Therapeutic Chemical Classification	2
3	21605295	DIAGNOSTIC AGENTS	V04	ATC 2nd	ATC	WHO Anatomic Therapeutic Chemical Classification	3
4	21602682	PITUITARY AND HYPOTHALAMIC HORMONES AND ANALOGUES	H01	ATC 2nd	ATC	WHO Anatomic Therapeutic Chemical Classification	3
5	21605212	VARIOUS	V	ATC 1st	ATC	WHO Anatomic Therapeutic Chemical Classification	4
6	21602681	SYSTEMIC HORMONAL PREPARATIONS, EXCL. SEX HORMON...	H	ATC 1st	ATC	WHO Anatomic Therapeutic Chemical Classification	4
7	21605331	Tests for thyroidea function	V04CJ	ATC 4th	ATC	WHO Anatomic Therapeutic Chemical Classification	1
8	21602687	Thyrotropin	H01AB	ATC 4th	ATC	WHO Anatomic Therapeutic Chemical Classification	1

# Example: Getting all Thyrogen concepts in OMOP

§1



```

drop table if exists #temp_DrugOfInterest;

;with cte_get_drug_classes as
(
    SELECT * FROM [Src].[OMOPV5_tvf_D02_GetDrugOrDrugClassByKeyword] ('Thyrogen',null)
)
--add the ingredient name using the tvf
select
    C.*
    , tvf.Ingredient_name
into #temp_DrugOfInterest
from
    cte_get_drug_classes as C
    outer apply
    [Src].[OMOPV5_tvf_D03_GetDrugIngredientsByID] (C.Entity_concept_Id, getdate()) as tvf
;
    
```

	Entity_concept_id	Entity_name	Entity_code	Entity_type	Entity_concept_class_id	Entity_vocabulary_id	Entity_vocabulary_name	Ingredient_name
1	790201	{2 (thyrotropin alfa 1.1 MG Injection [Thyrogen]) } Pack [...]	2166579	Concept	Branded Pack	RxNom	RxNom (NLM)	thyrotropin alfa
2	789776	thyrotropin alfa Injection [Thyrogen]	2166576	Concept	Branded Drug Form	RxNom	RxNom (NLM)	thyrotropin alfa
3	789775	thyrotropin alfa 1.1 MG [Thyrogen]	2166575	Concept	Branded Drug Comp	RxNom	RxNom (NLM)	thyrotropin alfa
4	789777	Thyrogen Injectable Product	2166577	Concept	Branded Dose Group	RxNom	RxNom (NLM)	thyrotropin alfa
5	789778	thyrotropin alfa 1.1 MG Injection [Thyrogen]	2166578	Concept	Branded Drug	RxNom	RxNom (NLM)	thyrotropin alfa
6	40149614	Glycoprotein Hormones, alpha Subunit 0.92 MG/ML Inj...	791485	Concept	Branded Drug	RxNom	RxNom (NLM)	NULL
7	19100165	thyrotropin alfa (USP) 0.9 MG/ML [Thyrogen]	578223	Concept	Branded Drug Comp	RxNom	RxNom (NLM)	NULL
8	45124056	{2 (thyrotropin alfa 0.9 MG Injection [Thyrogen]) } Pack [...]	58468003002	Mapped Code	11-digit NDC	NDC	National Drug Code (FDA and manufacturers)	NULL
9	44398869	thyrotropin alfa .9mg/mL INTRAMUSCULAR INJECTIO...	b0abb052-43c3-4127-a87a-efe2a77bcb36	Mapped Code	Prescription Drug	SPL	Structured Product Labeling (FDA)	NULL

# Example: Get patients with Thyrogen exposures

§1



```

Select Top 1000
    PERSON_ID
    , DRUG_EXPOSURE_ID
    , DRUG_CONCEPT_ID
    , c.Entity_name
    , DRUG_EXPOSURE_START_DATE
    , DRUG_EXPOSURE_END_DATE
    , ROUTE_SOURCE_VALUE
    , DOSE_UNIT_SOURCE_VALUE
    , QUANTITY
    , DAYS_SUPPLY
from src.OMOPV5_DRUG_EXPOSURE de
join #temp_DrugOfInterest c
on c.Entity_concept_Id = de.DRUG_CONCEPT_ID
    
```

	PERSON_ID	DRUG_EXPOSURE_ID	DRUG_CONCEPT_ID	ENTITY_NAME	DRUG_EXPOSURE_START_DATE	DRUG_EXPOSURE_END_DATE	ROUTE_SOURCE_VALUE	DOSE_UNIT_SOURCE_VALUE	QUANTITY	DAYS_SUPPLY
1	xxxxxxx	xxxxxxxx262	1537047	thyrotropin alfa 0.9 MG Injection [Thyrogen]	1999-XX-XX	1999-XX-XX	NULL	NULL	1	1
2	xxxxxxx	xxxxxxxx068	1537047	thyrotropin alfa 0.9 MG Injection [Thyrogen]	1999-XX-XX	1999-XX-XX	NULL	NULL	1	1
3	xxxxxxx	xxxxxxxx856	1537047	thyrotropin alfa 0.9 MG Injection [Thyrogen]	1999-XX-XX	1999-XX-XX	NULL	NULL	1	1
4	xxxxxxx	xxxxxxxx759	1537047	thyrotropin alfa 0.9 MG Injection [Thyrogen]	1999-XX-XX	1999-XX-XX	NULL	NULL	1	1
5	xxxxxxx	xxxxxxxx437	1537047	thyrotropin alfa 0.9 MG Injection [Thyrogen]	1999-XX-XX	1999-XX-XX	NULL	NULL	1	1
6	xxxxxxx	xxxxxxxx935	1537047	thyrotropin alfa 0.9 MG Injection [Thyrogen]	1999-XX-XX	1999-XX-XX	NULL	NULL	1	1
7	xxxxxxx	xxxxxxxx395	1537047	thyrotropin alfa 0.9 MG Injection [Thyrogen]	1999-XX-XX	1999-XX-XX	NULL	NULL	1	1
8	xxxxxxx	xxxxxxxx199	790201	{2 (thyrotropin alfa 1.1 MG Injection [Thyrogen]...	1999-XX-XX	2000-XX-XX	*Missing*	*Missing*	1	30
9	xxxxxxx	xxxxxxxx602	790201	{2 (thyrotropin alfa 1.1 MG Injection [Thyrogen]...	2000-XX-XX	2000-XX-XX	IM INJ	*Missing*	2	30
10	xxxxxxx	xxxxxxxx054	790201	{2 (thyrotropin alfa 1.1 MG Injection [Thyrogen]...	2000-XX-XX	2000-XX-XX	INTRAMUSCULAR	*Missing*	2	30
11	xxxxxxx	xxxxxxxx534	1537047	thyrotropin alfa 0.9 MG Injection [Thyrogen]	2000-XX-XX	2000-XX-XX	NULL	NULL	1	1



## Section 2:

# Cross-training with Patient Map tables



Yes!

## Not all data domains are OMOPified...

- Notes\*
- Microbiology
- HealthFactor (partial)
- EDIS (partial)
- IVC ← In progress!
- Etcetera



We're hard at work on converting them...

But until then – Map tables!

# Example: Microbiology data for patients getting Thyrogen §2



**Cohort:** Patients in OMOP receiving Thyrogen, 11/1/2015 – 12/31/2019

**Step 1:** Identify Thyrogen concepts

We did this in our  
TVF example!



Step 1 complete!



Store the needed concepts where they can be accessed.

*For our example we'll use a temp table called "#tmp\_DrugOfInterest"*

# Example: Identify patients exposed to thyrotropin alfa

§2



```
-- we only want data during our study period
] DECLARE @StudyStartDate DATE = '2015-11-01',
_ @StudyEndDate DATE = '2019-12-31'

-- Get patients that received the drug:

DROP TABLE IF EXISTS #FilteredPatients
] SELECT DISTINCT
era.PERSON_ID
INTO #FilteredPatients
FROM #tmp_DrugOfInterest drug
INNER JOIN OMOPV5.DRUG_ERA era
    ON drug.Entity_concept_Id = era.DRUG_CONCEPT_ID
WHERE DRUG_ERA_START_DATE <= @StudyEndDate
    AND DRUG_ERA_END_DATE >= @StudyStartDate
_
```

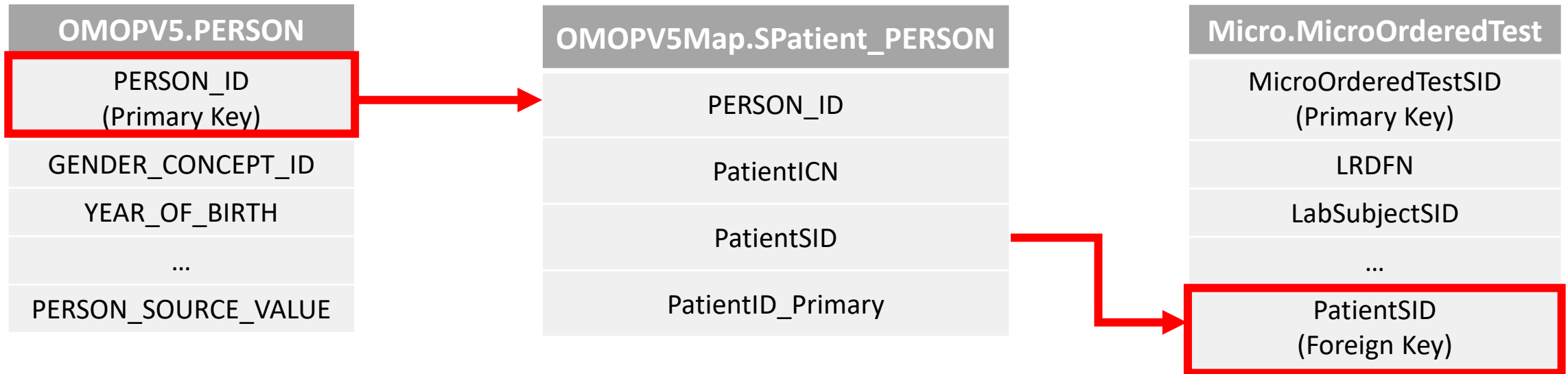


# How do we get from PERSON\_ID to PatientSID?

§2



# We use a Map table to link OMOP and CDW!



# Example: Map from PERSON\_ID to PatientSID

§2



- [-] [-] OMOPV5Map.SPatient\_PERSON
  - [-] [-] Columns
    - [-] PatientSID (int, null)
    - [-] PatientICN (varchar(50), null)
    - [-] PatientID\_Primary (bigint, null)
    - [-] PERSON\_ID (bigint, null)



```
SELECT
patients.PERSON_ID
, map.PatientICN
, map.PatientSID
, map.PatientID_Primary
INTO #MappedPatients
FROM #FilteredPatients patients
INNER JOIN OMOPV5Map.SPatient_PERSON map
ON map.PERSON_ID = patients.PERSON_ID
```

# Example: Join back to Microbiology to get our data



```
SELECT
PERSON_ID
,micro.*
INTO #MicroTests
FROM #MappedPatients map
INNER JOIN [Micro].[MicroOrderedTest] micro
ON map.PatientSID = micro.PatientSID
WHERE SpecimenTakenDateTime BETWEEN @StudyStartDate AND @StudyEndDate
```



	PERSON_ID	MicroOrderedTestSID	MicrobiologySID	MicroOrderedTestIEN	ParentFileNumber	SpecimenTakenDateTime	OrderedTest	OrderedLabChemTestUrgencySID
1	xxxx314	1000003007495	1000013881087	1	2	2016	87993.0000	1000000344
2	xxxx315	1200002005561	1200011867191	1	2	2015	87553.0000	1200000323
3	xxxx319	1400001351335	1400006035543	1	2	2016	87993.0000	1400000189
4	xxxx319	1400001351799	1400006035974	1	2	2016	87993.0000	1400000391
5	xxxx319	1400001329216	1400006023917	1	2	2016	87993.0000	1400000391
6	xxxx319	1400001434651	1400006094436	1	2	2016	87993.0000	1400000391



## Section 3:

# Strengthening your Concept Relationships

# Don't know what you don't know?

§3



## Try CONCEPT\_RELATIONSHIP!

### You can...

- Find related concepts using existing ontologies
  - SNOMED CT, ICD9/10, LOINC, RxNorm, MeSH...
- Create condition, drug, or lab groupings
- Roll concepts up to a more general level
- Link non-Standard concepts to OMOP Standard Concepts
- And much more!

# Example: How many kinds of thyroid disease?



- Parents**
- Disorder of endocrine system (disorder)
  - Disorder of neck (disorder)
  - Finding of thyroid gland (finding)

**Disorder of thyroid gland (disorder)** ☆

SCTID: 14304000

14304000 | Disorder of thyroid gland (disorder) |

- en Disorder of thyroid gland (disorder)
- en Disorder of thyroid gland
- en Thyroid disease
- en Thyroid disorder

Finding site → Thyroid structure

```
SELECT CONCEPT_ID_1,
con1.CONCEPT_NAME as Child_Name,
RELATIONSHIP_ID,
CONCEPT_ID_2,
con2.CONCEPT_NAME as Parent_Name,
cr.Valid_Start_Date,
```

	CONCEPT_ID_1	Child_Name	RELATIONSHIP_ID	Parent_Name	Child_Invalid_Reason
1	44801708	[X]Disorders of thyroid gland in diseases classifi...	Is a	Disorder of thyroid gland	U
2	44795728	[X]Iodine-deficiency-related (endemic) goitre, u...	Is a	Disorder of thyroid gland	U
3	44800111	[X]Other iodine-deficiency related thyroid disord...	Is a	Disorder of thyroid gland	D
4	44795000	[X]Other specified disorders of thyroid	Is a	Disorder of thyroid gland	U
5	4010825	Abscess of thyroid	Is a	Disorder of thyroid gland	NULL
6	4030044	Autonomous thyroid function	Is a	Disorder of thyroid gland	NULL
7	4047523	Complex thyroid endocrine disorder	Is a	Disorder of thyroid gland	NULL
8	4138374	Congenital anomaly of the thyroid gland	Is a	Disorder of thyroid gland	NULL
9	138113	Cyst of thyroid	Is a	Disorder of thyroid gland	NULL
10	140364	Disorder of thyrocalcitonin secretion	Is a	Disorder of thyroid gland	NULL
11	602944	Follicular lesion of thyroid	Is a	Disorder of thyroid gland	NULL
12	135772	Goiter	Is a	Disorder of thyroid gland	NULL
13	4107213	Hemorrhage of thyroid	Is a	Disorder of thyroid gland	NULL
14	4055363	Hurthle cell metaplasia of thyroid gland	Is a	Disorder of thyroid gland	NULL

- Children (31)**
- Abscess of thyroid (disorder)
  - Autonomous thyroid function (disorder)
  - Complex thyroid endocrine disorder (disorder)
  - Congenital anomaly of the thyroid gland (disorder)
  - Cyst of thyroid (disorder)
  - Degeneration of thyroid (disorder)
  - Disorder of thyrocalcitonin secretion (disorder)
  - Follicular lesion of thyroid (disorder)
  - Goiter (disorder)
  - Hemorrhage of thyroid (disorder)
  - Hurthle cell metaplasia of thyroid gland (disorder)
  - Hypersecretion of calcitonin (disorder)
  - Hyperthyroidism (disorder)
  - Hypoplasia of thyroid (disorder)
  - Hypothyroidism (disorder)



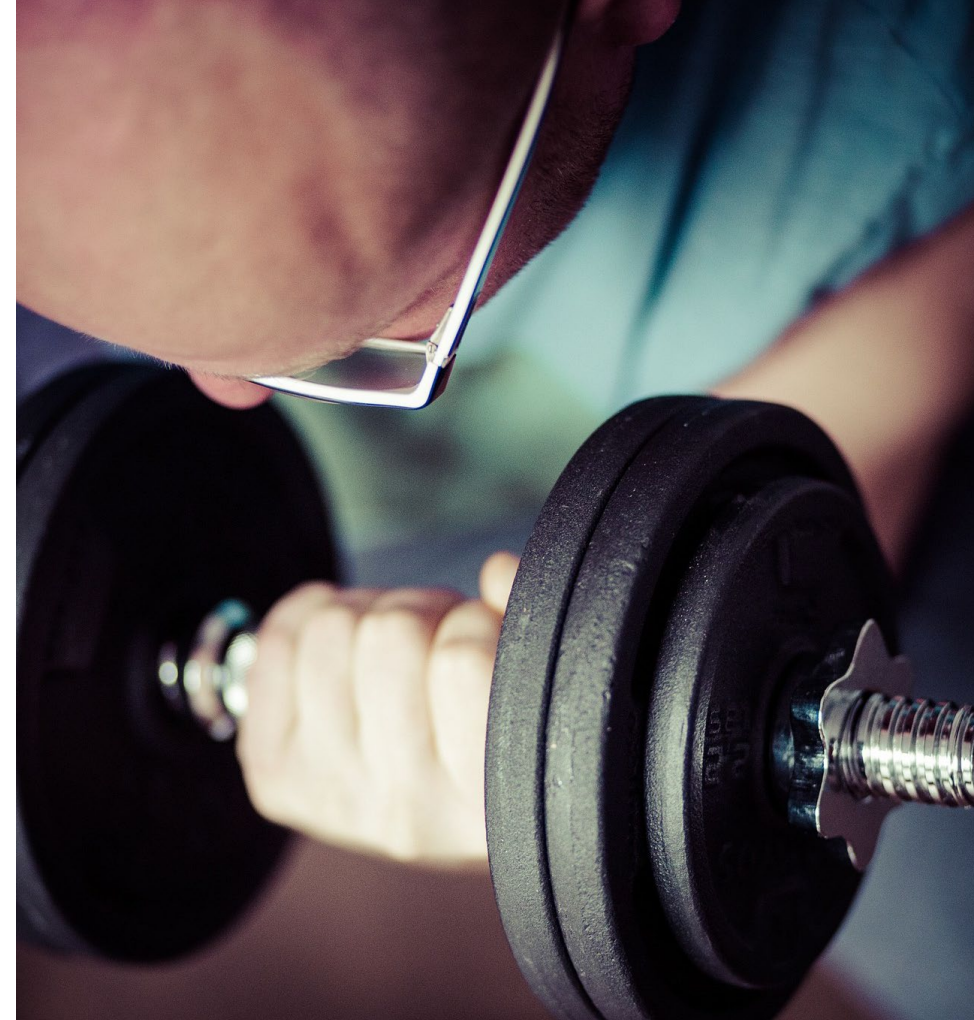


## Concept relationships:

- Are hand-created and hand-maintained
- Don't exist for VA concepts
- Are vocabulary-specific

## Check your work:

- Which patients/data fall through gaps in your definitions?





# Section 4:

## Secrets to well-defined (L)abs

# What are the best practices for OMOP lab data?

§4



## Use lab groupers!!

### OMOP lab data...

- Are mapped through automated & manual work
- Vary by time and Sta3n (site)
- Are never as clean as we want them to be...

### Lab groupers make your pipeline:

- Reproducible across sites
- Reproducible across time

...And they **already exist** for many common labs!

✚ Total Cholesterol (BSP)	4/11/2023 1:00 AM
✚ Thyroxine T4 (BSP)	7/1/2020 1:00 AM
✚ Thyrotropin (BSP)	9/12/2023 1:00 AM
✚ Urine Mucus	10/24/2023 1:00 AM
✚ Urine Color	7/1/2019 1:00 AM
✚ Urine Bacteria	9/26/2023 1:00 AM
✚ Urine Appearance	7/1/2019 1:00 AM
✚ Urea Nitrogen/Creatinine (URINE)	10/18/2023 1:00 AM
✚ Urea Nitrogen/Creatinine (OTHER)	10/18/2023 1:00 AM
✚ Urea Nitrogen/Creatinine (BSP)	10/18/2023 1:00 AM

# Where can you find existing groupers?

\$4



## Welcome to VA OMOP Academy

The latest OMOP data refresh was March 20, 2024 and includes CDW data from October 1, 1999 through February 16, 2024.

**NEW! VA Millennium OMOP data are available on RB02 and RB03 servers. The latest release includes CDW Millennium data from the implementation of the first Millennium site through February 19, 2024. To get started using VA Millennium OMOP, request access through DART.**

This training is intended to teach you about the VA OMOP Common Data Model (CDM), the data that it contains, and how to use it effectively.

The OMOP CDM defines table structures for each of the data domains in a Person- and Provider-centric model. Almost all tables have foreign keys to the PERSON table and a date field allows for a longitudinal view on all the healthcare-relevant events. In addition, Providers carrying out care are linked to many of the events as well. Both are linked to healthcare organizations (hospitals, independent physician associations), care sites (doctor's offices, hospital departments etc.) and physical locations (addresses, station). The CDM aims to provide data organized in a way optimal for analysis rather than for the purpose of operational needs of health care providers or payers. The domains are modeled in a normalized relational data model where for each record, the identity of the person and a date is captured at a minimum.

To standardize the content of those records, the CDM relies on Standardized Vocabulary where necessary and appropriate corresponding standard healthcare concepts. If possible, these concepts are leveraged from national or industry standardization or vocabulary definition organizations or initiatives, such as the National Library of Medicine, the Department of Veterans' Affairs, the Center of Disease Control and Prevention, etc. VA OMOP is technology neutral. It can be realized in any relational database, such as Oracle, MySQL etc., or as SAS analytical datasets. The CDM is optimized for data processing and computational analysis to accommodate data sources that vary in size, including databases with up to hundreds of millions of persons and billions of clinical observations.

## OMOP Training

The training is based on meeting 5 core competencies:

- Mastering the VA OMOP model and success with standard vocabularies
- Conquering concept relationships
- Triumph in Table Value Functions
- Daring to define study criteria and boldly building study populations
- Designating dimension tables and key-foreign linking

## VA OMOP Support Contacts:

Zhenyu Lu, PhD, MSIS

Ben Hardisty, PhD

Olga Efimova, MD, PhD

Demario Walton, MS

OMOP Help Desk Concierges/Data Managers with VINCI Data Services

Email: [VINCI@va.gov](mailto:VINCI@va.gov) and please put "OMOP" in the subject line so it will be routed quickly.

## OMOP Resources

- [Quick Start](#)
- [VA OMOP Documentation](#)
- [OMOP Lab Mapping Resource](#)
- [OHDSI.org](#)
- [OHDSI Documentation](#)
- [OHDSI Common Data Model Wiki](#)
- [OHDSI Video Tutorials](#)
- [Request VA OMOP access for Research using DART](#)

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# Understanding lab group status: “Sustained” labs

§4



## Lab Groups Last Reviewed Dates

+ New ▾ Edit in grid view Share ...

Title ↓ ▾ Last\_Mapping\_...

Total Cholesterol (BSP) 4/11/2023 1:00 AM

Thyroxine T4 (BSP) 7/1/2020 1:00 AM

Thyrotropin (BSP) 9/12/2023 1:00 AM

Urine Mucus 10/24/2023 1:00 AM

Urine Color 7/1/2019 1:00 AM

Urine Bacteria 9/26/2023 1:00 AM

## Sustained labs: Reviewed every refresh.

- Labs reviewed since **09/1/2023**
- Automated change detection flags groups for manual review
- Mapping team extracts & reviews changed/new rows
- Mappings edited as needed



# Understanding and using curated lab groups



## Lab Groups Last Reviewed Dates

+ New ▾ Edit in grid view Share ... ≡

Title ▾ ▾	Last_Mapping_...
Total Cholesterol (BSP)	4/11/2023 1:00 AM
Thyroxine T4 (BSP)	7/1/2020 1:00 AM
Thyrotropin (BSP)	9/12/2023 1:00 AM
Urine Mucus	10/24/2023 1:00 AM
Urine Color	7/1/2019 1:00 AM
Urine Bacteria	9/26/2023 1:00 AM

## Lab Groups by LOINC with InstanceCount > Thyrotropin (BSP) [See all](#)

+ New ▾ Edit in grid view Share ... ≡ All Items ▾ ⓘ

Title ▾ ▾	LOINC_Criteria ▾	TotalInstanceC...
Thyrotropin (BSP)	3016-3	78,630,249
Thyrotropin (BSP)	3015-5	3,038,783
Thyrotropin (BSP)	11579-0	18,050
Thyrotropin (BSP)	27975-2	1

# Augmenting a curated group with more LOINCs

§4



LOINC

SearchLOINC



LOINC

thyrotropin component:Thyrotropin componentwordcount:1

Status	LOINC	Long Common Name	Component	Property	Timing	System	Scale	Method	Class	Type	Example UCUM Units
	11579-0	Thyrotropin [Units/volume] in Serum or Plasma by Detection limit <= 0.05 mIU/L	Thyrotropin	ACnc	Pt	Ser/Plas	Qn	Detection limit <= 0.05 mIU/L	CHEM	🧪	m[IU]/L
	11580-8	Thyrotropin [Units/volume] in Serum or Plasma by Detection limit <= 0.005 mIU/L	Thyrotropin	ACnc	Pt	Ser/Plas	Qn	Detection limit <= 0.005 mIU/L	CHEM	🧪	m[IU]/L
⚠️	14297-6	Thyrotropin [Moles/volume] in Serum or Plasma ←	Thyrotropin	SCnc	Pt	Ser/Plas	Qn		CHEM	🧪	
	20452-9	Thyrotropin [Presence] in Blood ←	Thyrotropin	PrThr	Pt	Bld	Ord		CHEM	🧪	
	26998-5	Thyrotropin [Units/volume] in Saliva (oral fluid)	Thyrotropin	ACnc	Pt	Saliva	Qn		CHEM	🧪	m[IU]/L
⚠️	27975-2	Thyrotropin [Mass/volume] in Serum or Plasma	Thyrotropin	MCnc	Pt	Ser/Plas	Qn		CHEM	🧪	ng/mL
	29574-1	Thyrotropin [Presence] in DBS	Thyrotropin	PrThr	Pt	Bld.dot	Ord		CHEM	🧪	
	29575-8	Thyrotropin [Units/volume] in DBS	Thyrotropin	ACnc	Pt	Bld.dot	Qn		CHEM	🧪	m[IU]/L
	3015-5	Thyrotropin [Units/volume] in Blood	Thyrotropin	ACnc	Pt	Bld	Qn		CHEM	🧪	m[IU]/L
	3016-3	Thyrotropin [Units/volume] in Serum or Plasma	Thyrotropin	ACnc	Pt	Ser/Plas	Qn		CHEM	🧪	m[IU]/L



# Using LabChemTest\_Concept to gather labs

§4



```
SELECT [LabChemTestSID]
, [LOINC_Original]
, [LOINC_Mapped]
, [Sta3n]
, [LabChemTestName]
, [TopographySID]
, [Unit_Original]
, [Unit_Mapped]
, [Topography]
, [Topography_Mapped]
, [DOMAIN_ID]
, [CONCEPT_ID]
, [SOURCE_CONCEPT_ID]
, [CONCEPT_NAME]
, [SOURCE_CONCEPT_NAME]
, [VALUE_CONCEPT_ID]
, [UNIT_CONCEPT_ID]
, [InstanceCount]
, [PatientCount]
FROM [OMOP_V5_QA].[OMOPV5Dim].[LabChemTest_CONCEPT]
```

```
where LOINC_Mapped in
('11579-0', '11580-8', '27975-2', '29574-1', '3015-5', '3016-3', '57416-0'
OR
((labchemtestname like '%thyrotropin%'
OR LabChemTestName like '%TSH%'
OR labchemtestname like '%thyroid stim%'))
AND
(LabChemTestName not like '%antibody%'
AND LabChemTestName not like '%recept%'
AND LabChemTestName not like '%globulin%'
AND LabChemTestName not like '%ig%'))
```

# Defining a lab grouper when one doesn't exist

§4



LOINC  Search

RESULTS 2    DISPLAYING 200 1-2    FILTER    VIEW List Card    EXPORT

Status	LOINC	Long Common Name	Component
⊘	13191-2	Deprecated Rheumatoid factor [Units/volume] in Serum	Rheumatoid factor
	11572-5	Rheumatoid factor [Units/volume] in Serum or Plasma	Rheumatoid factor

```
SELECT TOP (1000) [LabChemTestSID]
, [LOINC_Original]
, [LOINC_Mapped]
, [Sta3n]
, [LabChemTestName]
, [TopographySID]
, [Unit_Original]
...
, [PatientCount]
FROM [CDW_OMOP].[OMOPV5Dim].[LabChemTest_CONCEPT]
where LOINC_Mapped in ('13191-2', '11572-5')
OR (LabChemTestName like '%rheumatoid factor%')
```

**LOINC Groups** <https://loinc.org/groups/>

**Pulling together LOINC codes isn't as easy as it first seems**

Also try LOINC Groups!

Maybe you're trying to create a flowsheet display within an EHR system. Or, maybe you're retrieving data to fulfill a research project. Perhaps you are processing data from many sources for a research project.

# Review rows to define exclusions... And repeat

§4



LabChemTestSID	LOINC_Original	LOINC_Mapped	Sta3n	LabChemTestName
800023499	5297-7	5297-7	593	RHEUMATOID FACTOR [Serum](INACT)
120002054	11572-5	11572-5	516	RHEUMATOID FACTOR - CRYO PNL (SO)
1200020023	31046-6	53562-5	558	RHEUMATOID FACTOR
1000091532	NULL	53562-5	636	RHEUMATOID FACTOR(.7/19)*ia
1400044304	15203-3	53562-5	523	RHEUMATOID FACTOR,FLUID(THRU 7/17/03)
1600059480	5297-7	5297-7	590	Rheumatoid Factor (ANA panel)
1000137010	30231-5	30231-5	549	RHEUMATOID FACTOR, BODY FLUID(WILD)
800038888	11572-5	11572-5	653	RA FACTOR PVAMC (ENDED 08-2005)
1200054726	11572-5	11572-5	517	RHEUMATOID FACTORS
1600000141	11572-5	11572-5	600	Rheumatoid factor (OUTPUT)
1600031536	11572-5	11572-5	632	RHEUMATOID FACTOR,LATEX,TURBIDIM(LA...
1200012142	NULL	53562-5	621	RHEUMATOID FACTOR (QUAN/QUAL)

vhacdwdwhdbs101 (15.0 RTM) | VHA09\WHATVHMclmM (111) | CDW\_OMOP | 00:00:00 | 1,008 rows

```
SELECT [LabChemTestSID]
, [LOINC_Original]
, [LOINC_Mapped]
, [Sta3n]
, [LabChemTestName]
, [TopographySID]
, [Unit_Original]
, [Unit_Mapped]
, [Topography]
, [Topography_Mapped]
, [DOMAIN_ID]
, [CONCEPT_ID]
, [SOURCE_CONCEPT_ID]
, [CONCEPT_NAME]
, [SOURCE_CONCEPT_NAME]
, [VALUE_CONCEPT_ID]
, [UNIT_CONCEPT_ID]
, [InstanceCount]
, [PatientCount]
FROM [CDW_OMOP].[OMOPV5Dim].[LabChemTest_CONCEPT]

where LOINC_Mapped in ('13191-2','11572-5')
OR ((LabChemTestName like '%rheumatoid factor%')
AND (LabChemTestName not like '%body%'))
```

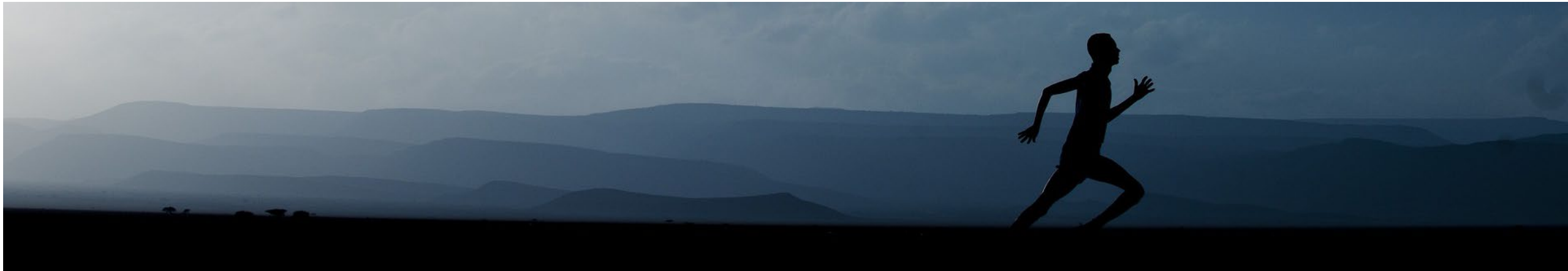
# How can you maintain your lab data over time?

§4



## Routine exercises – do them monthly!

- Check labs in sustainment – see what's changed
- Check your row counts per lab in your groupers
- Rerun lab-based cohort definitions





# Section 5:

## Other tips for top OMOP form

# How can you improve your OMOP queries?

§5



```
-- we only want data during our study period  
] DECLARE @StudyStartDate DATE = '2015-11-01',  
_ @StudyEndDate DATE = '2019-12-31'
```

**Date filter your queries**

TABLE_NAME	COLUMN_NAME
OMOPV5_MEASUREMENT	x_CARE_SITE_ID
OMOPV5_MEASUREMENT	x_Abnormal
OMOPV5_MEASUREMENT	x_StaffSID
OMOPV5_MEASUREMENT	x_LabChemTestSID
OMOPV5_MEASUREMENT	x_TreatmentSID

**Use source concepts and x\_ columns**



**Leverage OHDSI tools**

# Make it a date (filter)!

§5



```
-- We only want data during our study period
DECLARE @StudyStartDate date = '2015-11-01'
DECLARE @StudyEndDate date = '2019-12-31'

-- Write a query for measurement data happening during our study period
= SELECT TOP 1000 *
FROM Src.OMOPV5_MEASUREMENT WITH (NOLOCK)
WHERE MEASUREMENT_DATE BETWEEN @StudyStartDate AND @StudyEndDate
AND MEASUREMENT_CONCEPT_ID = '3009201' -- Thyrotropin lab, corresponding to LOINC 3016-3
AND CohortName = 'Cohort'
```



# Don't skip ~~leg day~~ source concepts – or x\_ columns

§5



## Source concepts – quickly find that original\* mapping

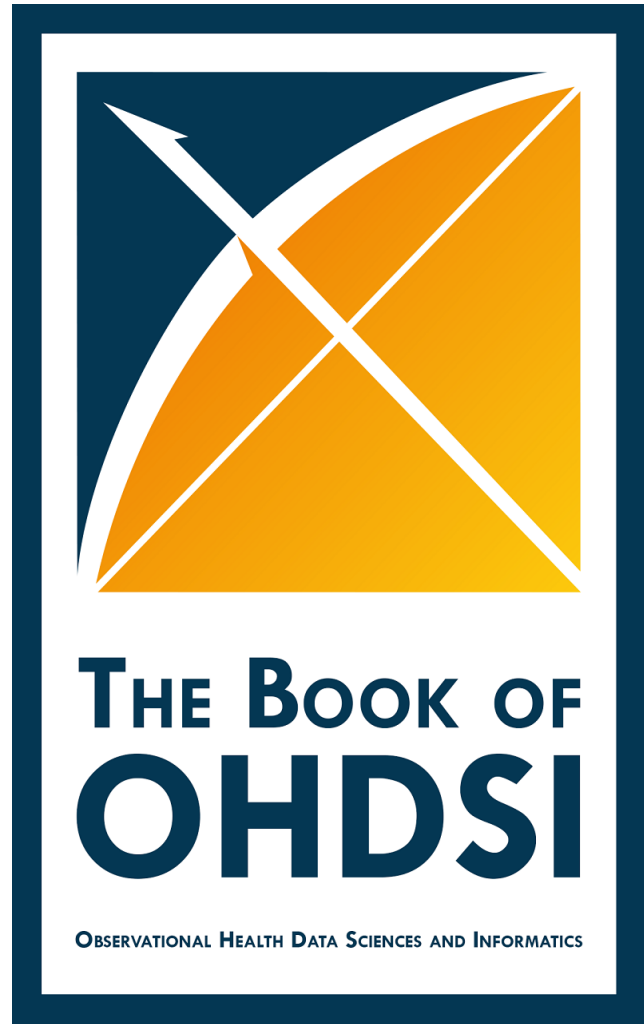
```
SELECT TOP 100 *
FROM Src.OMOPV5_CONDITION_OCCURRENCE WITH (NOLOCK)
WHERE CONDITION_SOURCE_CONCEPT_ID IN
    (SELECT CONCEPT_ID FROM Src.OMOPV5_CONCEPT
     WHERE CONCEPT_CODE LIKE 'E0[0-7]%' -- the code range for thyroid diseases
     AND VOCABULARY_ID LIKE 'ICD10%')
```

## x\_ columns – crosswalk efficiently to source data

	TABLE_CATALOG	TABLE_SCHEMA	TABLE_NAME	COLUMN_NAME	ORDINAL_POSITION	COLUMN_DEFAULT	IS_NULLABLE	DATA_TYPE	CHARACTER_MAXIMUM_LENGTH
1	ORD_Matheny_201204020D	Src	OMOPV5_MEASUREMENT	x_CARE_SITE_ID	22	NULL	YES	int	NULL
2	ORD_Matheny_201204020D	Src	OMOPV5_MEASUREMENT	x_Abnormal	23	NULL	YES	varchar	100
3	ORD_Matheny_201204020D	Src	OMOPV5_MEASUREMENT	x_StaffSID	24	NULL	YES	bigint	NULL
4	ORD_Matheny_201204020D	Src	OMOPV5_MEASUREMENT	x_LabChemTestSID	25	NULL	YES	int	NULL
5	ORD_Matheny_201204020D	Src	OMOPV5_MEASUREMENT	x_TopographySID	26	NULL	YES	int	NULL
6	ORD_Matheny_201204020D	Src	OMOPV5_MEASUREMENT	x_Source_Table	27	NULL	YES	varchar	100
7	ORD_Matheny_201204020D	Src	OMOPV5_MEASUREMENT	x_Source_ID_Primary	28	NULL	YES	bigint	NULL
...									
12	ORD_Matheny_201204020D	Src	OMOPV5_VISIT_OCCURRENCE	x_WorkloadLogicFlag	23	NULL	YES	char	1

# Get outside your database zone – OHDSI web tools

§5



Read up on all things OHDSI



Search & load standardized vocabularies



Design & execute analyses on CDM data

# Cooldown: What we've covered today



1. How to use the OMOP TVFs
2. Using a Map table to get non-CDM data
3. Searching with Concept Relationships
4. Defining and using lab groupers
5. OHDSI web resources, & other tips





## Key Documentation references:

- [OMOP OHDSI Resources](#)
- [VINCI OMOP Academy](#)
- [VA CIPHER Wiki:OMOP](#)

## If you have questions, please contact us!

VINCI Services Team - OMOP Help Desk (Ben Hardisty, Lu Zhenyu, Carol Chia)

E-mail [VINCI@va.gov](mailto:VINCI@va.gov) using subject "OMOP"