



# Conversion of National Veterans Affairs Health Cost Data into the OMOP CDM: Preliminary Transformation

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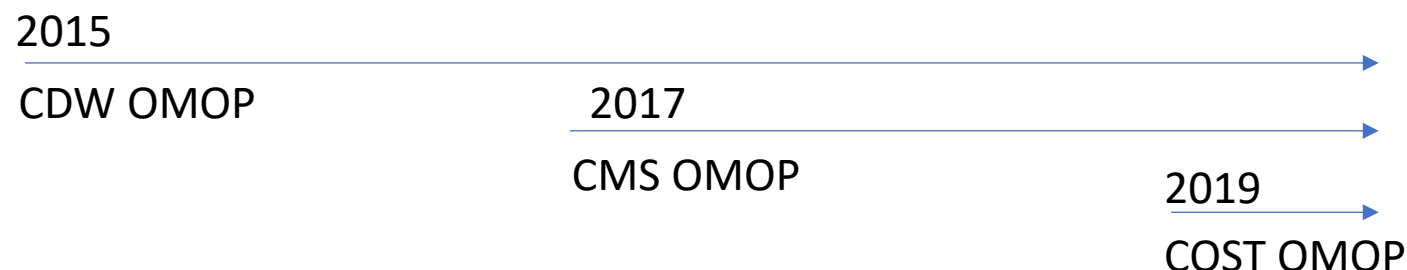
# Veterans Affairs Healthcare Data

- Integrated care network, includes
  - Inpatient hospitals
  - Outpatient primary care
  - Subspecialist clinics
  - Outpatient pharmacies
  - Rehabilitation facilities
  - Long-term care facilities
  - Domiciliaries, etc
- All VA personnel use the same EHR, Veterans Information Systems and Technology Architecture/Computerized Patient Record System
- Data from all sites are stored in the Corporate Data Warehouse (CDW)
- Provisioned by the VA Informatics and Computing Infrastructure (VINCI)



# OMOP Development in VA

- Starting in 2015, VINCI began transforming VA CDW into OMOP
  - From six months release to monthly release
- Starting in 2017, VINCI began cooperating with VIREC (VA Information Resource Center) to transform CMS data into OMOP
- Starting in 2019, VINCI began cooperating with HERC (VA Health Economics Research Center) to transform cost data into OMOP



# Publications

- Kristine E. Lynch, Stephen A. Deppend, Scott L. DuVall, Benjamin Viernes, Aize Cao, Daniel park, Elizabeth Hanchrow, Kushan Hewa, Michael Matheny, 'Incrementally transforming electronic medical records into the OMOP common data model: A multidimensional quality assurance approach', *Applied Clinical Informatics*, 2019 10(5), 794-803
- Fern FitzHenry, Olga V. Patterson, Jason Denton, Jesse Brannen, Ruth M. Reeves, Scott L. DuVall, Michael E. Matheny, 'OMOP CDM for Natural Language Processing: Piloting a VA NLP Data Set', *OHDSI*, 2017
- Sharidan K. Parr, Thomas A. Lasko, Matthew S. Shotwell, Scott L. DuVall, Michael E. Matheny, 'Machine Learning to Classify Laboratory Tests in a National Electronic Health Record System Database', *OHDSI* 2019.
- Aize Cao, Margaret Gonsoulin, Kristin de Groot, Elizabeth Hanchrow, Daniel Park, Kristine Lynch, Denise Hynes, Scott L. DuVall, Michael E. Matheny, Stephen A. Deppen, 'Quality assurance of demographics consistency between Veterans Affairs and Medicare data', *OHDSI*, 2017
- Kristin de Groot, Aize Cao, Qiuying Lucy Zhang, Denis M. Hynes, Donghui Kan, Amanda Talor, Linda Kok, Fern FitzHenry, Scott L. DuVall, Mari Souden, Michael Matheny, 'Transforming Medicare Research Identifiable Files (RIF) into the OMOP Common Data Model', *OHDSI*, 2018



# VA HealthCare Cost Data

- Produced and Managed by VA Managerial Cost Accounting Office (MCA)
  - Inpatient/outpatient related services
  - Widely used in research
- The MCA inpatient cost has six subtotals:
  - Bed-day of care (nursing & residential care),
  - Radiology,
  - Surgery,
  - Pharmacy,
  - Laboratory,
  - All other.
- The costs within each subtotal are summed into three categories: fixed direct, fixed indirect, and variable direct. The sum of these cost categories equals the total cost for each encounter.
- Several cost components are associated with different types of services provided to a patient, such as technician labor, provider labor, supply costs, and equipment depreciation



# Cost OMOP

- We sought to transform the MCA cost data into OMOP
- Integrated with CDW OMOP
- Mapping logic
  - The CDW and the MCA use different business rules
  - And CDW and OMOP use different granularity in defining clinical events
- Start from inpatient cost
  - we developed logic to adapt MCA cost to the visit level.
- Version 5.3 + 6



# Inpatient Cost

- Map MCA data between October 1999 and May 2020.
- MCA and CDW use the same PERSON\_ID.
- MCA data cleaning
  - Encounter and location based
  - Earlier admit date and latest discharge date for the encounter.
  - Discharge date imputation
- Map MCA cost to CDW OMOP visit under the concept of
  - Inpatient care
  - Long term care
  - Inpatient observation care



# Cost Distribution Logic

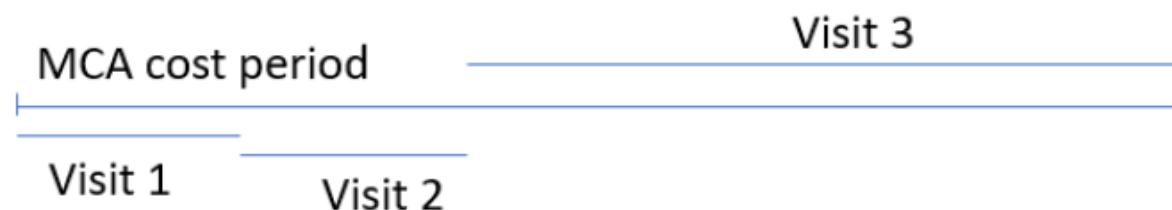
- Same hospital stay
  - MCA total cost to one OMOP visit (4a)
  - Two encounters in MCA cost have one visit in CDW OMOP
  - Two encounters in MCA cost have two visits in CDW OMOP





# Cost Distribution Logic

- Not same hospital stay
  - MCA total cost to more than one OMOP visits, which formulated as one visit era. (4b)



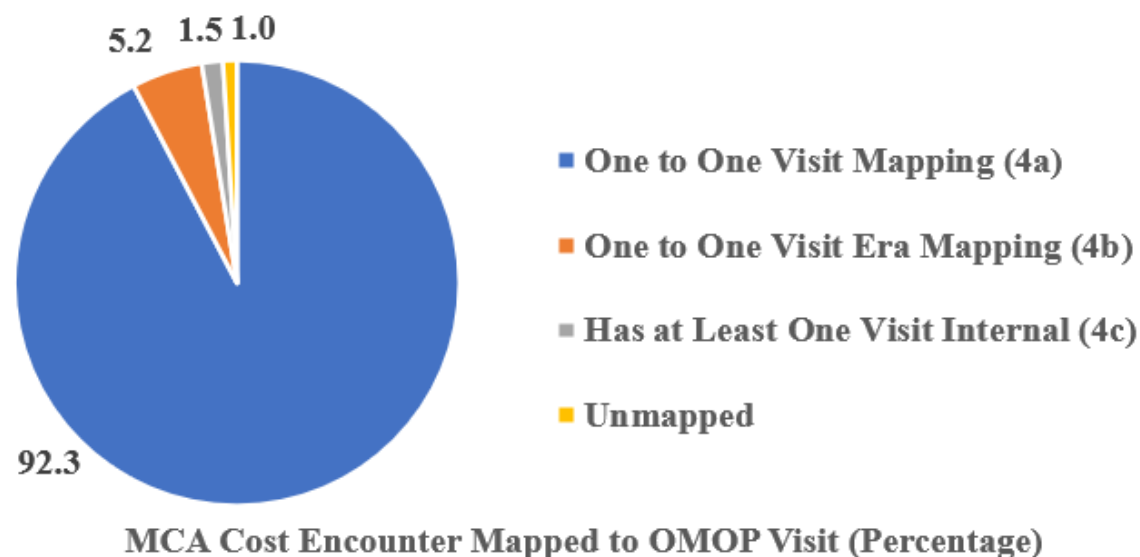
- MCA total cost to OMOP visits that fall in cost period but were not identified in above. (4c)





# Results

- These rules improved our ability to match MCA and CDW OMOP encounters.
  - More than 9 million inpatient cost find direct hospital visits in CDW OMOP.
  - For the cost records that don't have a direct matched hospital stay in CDW OMOP but have a matched one after OMOP visit era were created, 0.5 million cost records were distributed to more than 1.2 million CDW OMOP clinical visits.
  - About 0.1 million cost records that could not find a matched one after OMOP visit era created but contain at least one or partial hospital stay, were linked to 0.4 million CDW OMOP visits.





## Conclusion and Future Work

- We demonstrate that MCA inpatient cost data can be successfully transformed into OMOP CDM COST with events identified from CDW OMOP based on the logic we developed.
- The next step is to map outpatient costs and encounters



# Acknowledgement

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- OHDSI for the platform