

# SNOMED CT Disease Hierarchies and the Charlson Comorbidity Index (CCI): An analysis of OHDSI methods for determining CCI

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## INTRO:

The CCI is widely used (original paper cited over 10,000 times) in research and clinically to assess health status and mortality risk. The OHDSI method for CCI in the *FeatureExtraction* R package uses the SNOMED hierarchy to define CCI comorbidities, which is somewhat different than most published research which use the Quan et al. (2005) ICD method or something similar to it.

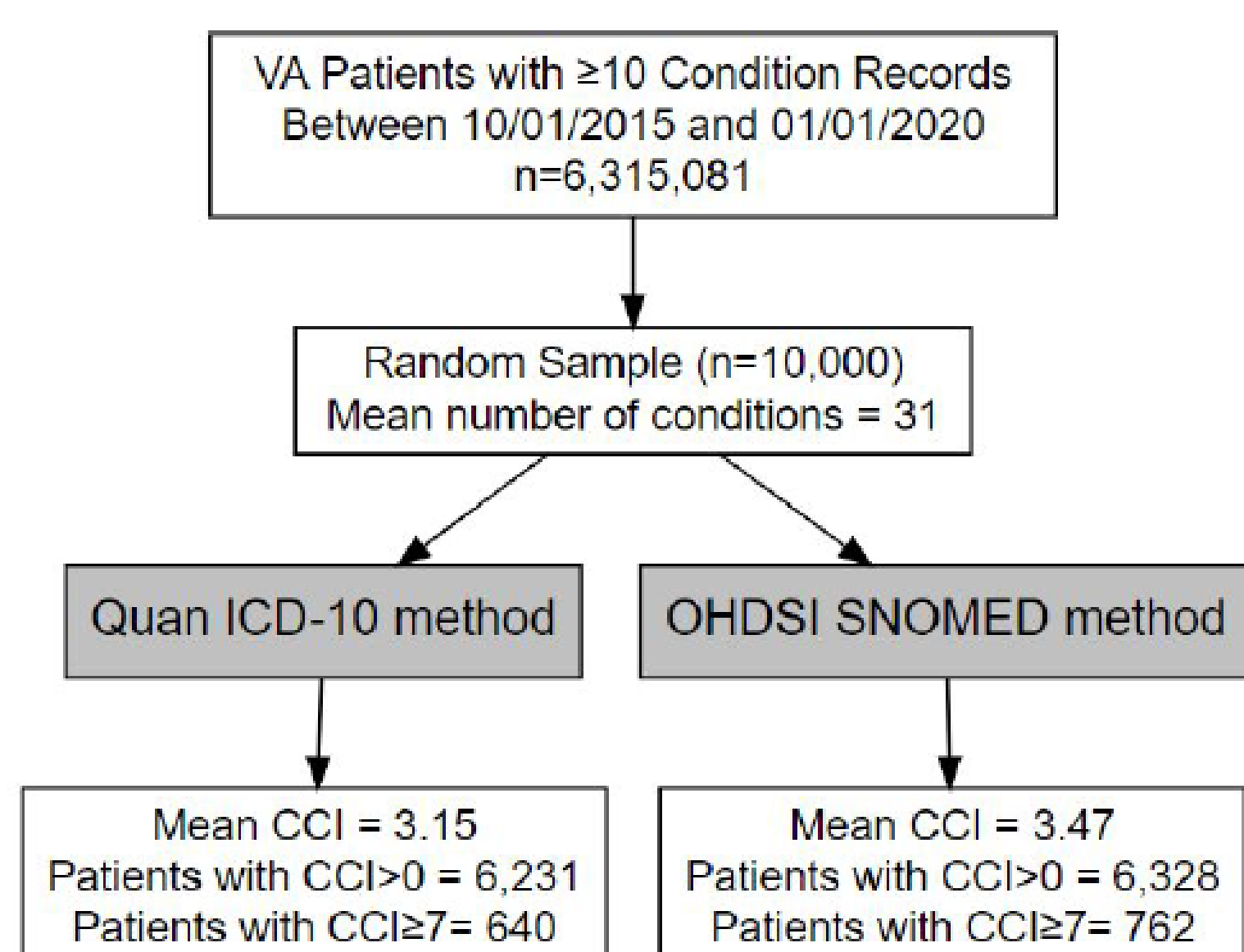
## METHODS

1. Analyzed random sample of 10,000 patients in VA OMOP between 10/01/2015 and 01/01/2020 that had at least 10 conditions recorded.
2. Collected all condition data (ICD10 and SNOMED, CONDITION\_SOURCE\_CONCEPT and CONDITION\_CONCEPT)
3. Evaluated patient-level difference between methods and OMOP concept mapping difference.
4. evaluated OMOP concepts that would be excluded from one method if the other method is used

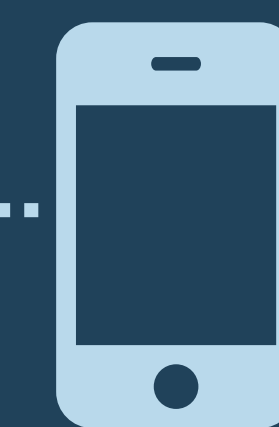
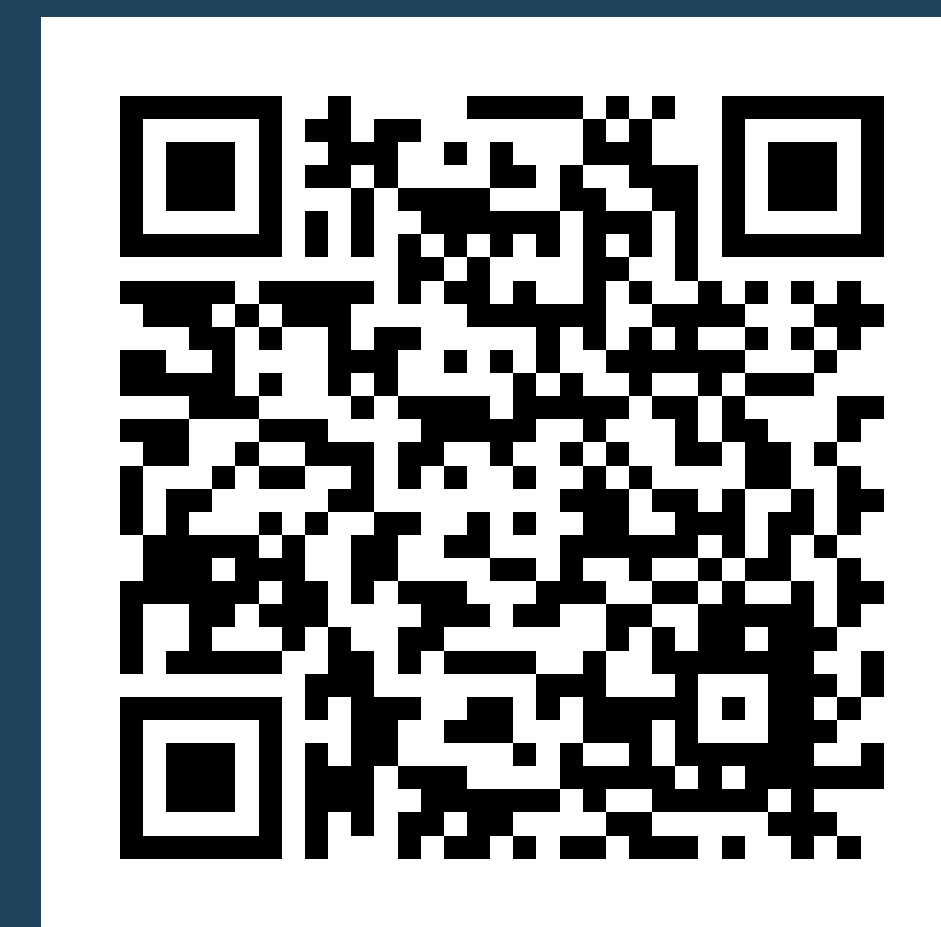
## RESULTS

- Random sample of patients had a mean age of 64.6, was 90.8% male, and 72.6% white.
- On Average, the OHDSI CCI method leads to a higher CCI score at the population level, but not necessarily for all patients.
- The Quan Method also results in 171 concepts not identified by the OHDSI method.
- 37.7% of patients have no Charlson comorbidities via the Quan method vs. 36.7% via the OHDSI method.

### CCI Score differences by Method



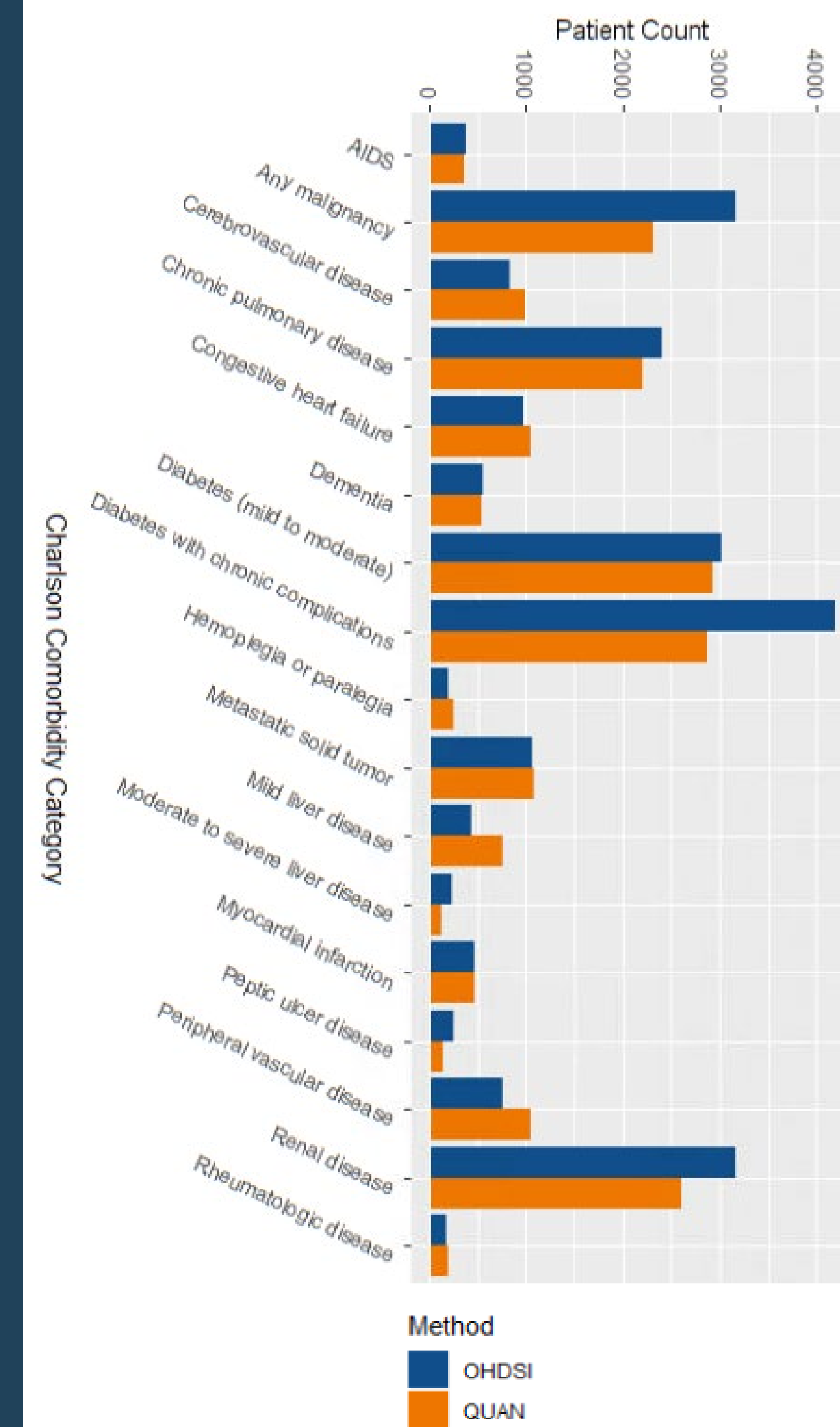
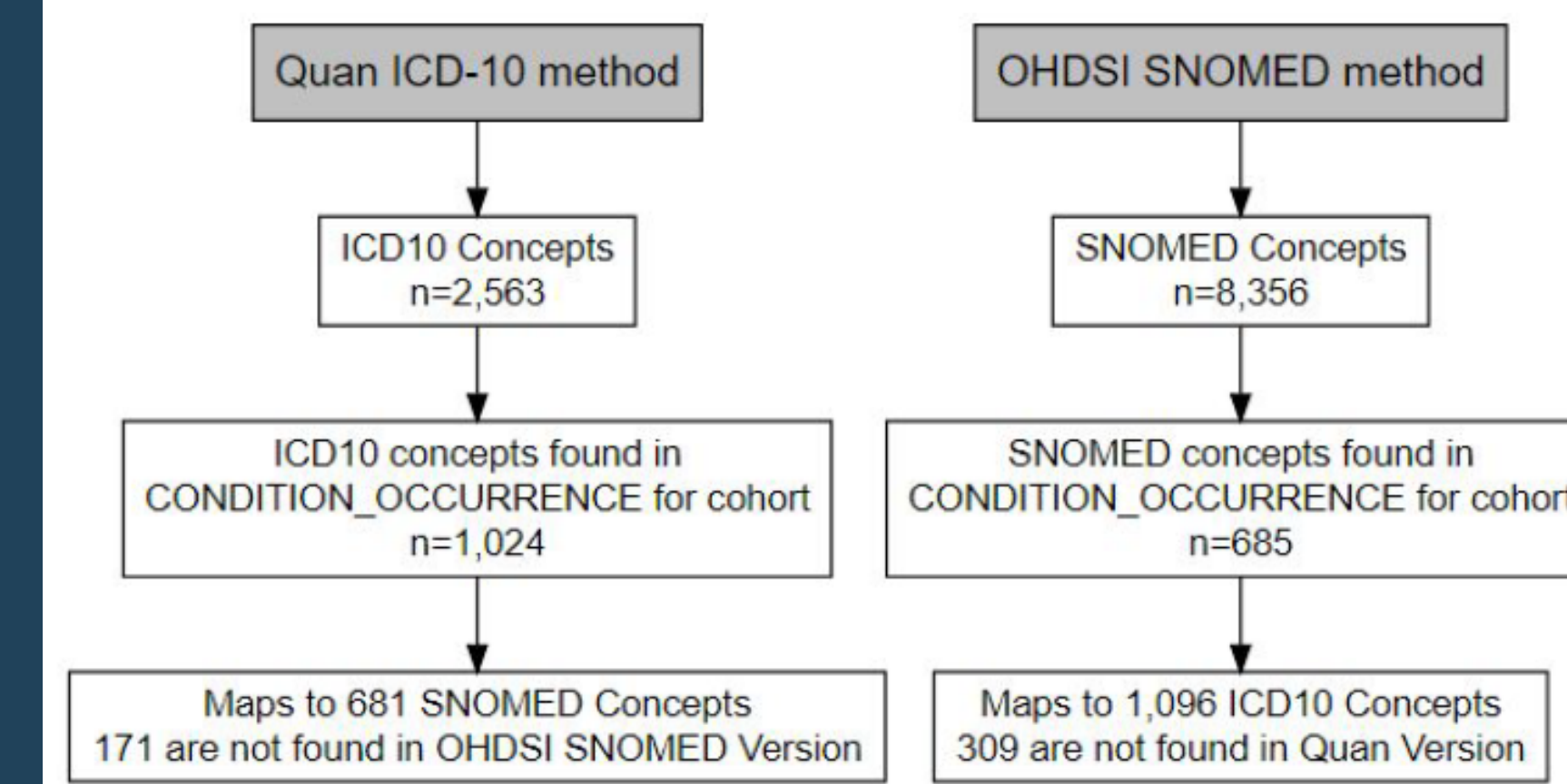
Due to the SNOMED Hierarchy, OHDSI's FeatureExtraction CCI method maps to 309 ICD10 concepts not found in Quan et al. (2005), leading to a higher, on average, CCI score.



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Across all categories of the Charlson comorbidity index, it is evident that each method would include different patients into its categories. Understanding the differences between source ICD coding and OHDSI mappings to SNOMED are essential to determine whether mappings lead to expected clinical phenotypes. More research is necessary to determine whether one method, or some combination of the two is more predictive of mortality.

### Concept differences by Method



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