Learning Effective Treatment Pathways from Observational Data
A Multinational Cohort Study for Type 2 Diabetes

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Diabetes

- 1.5 Million deaths in the year 2015.
- Global prevalence of 8.5% in the year 2014.
- Causes blindness, kidney failure, cardiovascular disorders, pregnancy complication and nerve damage.
- A chronic disease.
Treatment Guidelines & Practice of Medicine in Type-2 Diabetes

Which is the best second-line treatment to reduce HbA1c and prevent events related to myocardial infarction, kidney- and eye-disorders in patients with T2D?
Our Approach to Understand Effectiveness of Second-line Treatment in T2D within OHDSI Framework

Cohort Method and Empirical Calibration

Study site
- Stanford Health Care
- Mount Sinai Icahn School of Medicine
- Columbia University Medical Center
- IQVIA Disease Analyser France
- Ajou University, South Korea
- Truven MarketScan Commercial Claims and Encounters
- Truven MarketScan Medicare
- Optum Clinformatics Data Mart

Gather results, report findings

JAMA Network Open
Vashisht et al. 2018
### Total Number of Patients
Across Eight Healthcare Systems

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<th>No. of Patients</th>
<th>%</th>
<th>Time, y</th>
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Rule Based Cohort Construction from EHRs

Second line treatments: Sulfonylureas, DPP4-Inhibitors and Thiazolidinediones.

Outcome: Reduction in HbA1c <= 7%, myocardial infarction, kidney- and eye-disorders.
Study Population & Analysis

Example: comparison of Sulfonylureas vs DPP4-Inhibitors for Outcome reduction in HbA1c <= 7% using CohortMethod and EmpiricalCalibration
Results across healthcare systems are summarize using random effect meta-analysis approach.
DPP4-Inhibitors compared to Sulfonylureas when prescribed after Metformin appears to have lower hazard of Myocardial Infarction and Eye Disorders in patient with Type-2 diabetes.
Limitations of the Study

Confounders

- We did not consider actual values of lab results but just the presences or absence of the laboratory test ordered for the patient - for example, we did not consider the actual blood pressure of the patient, but relied on if the blood pressure was measured.

- We did not consider other factors such as the socio economic status of the patients that might confound the analysis - this information is often not reported in EHR setting.

Meta Analysis

- There was considerable amount of heterogeneity in the meta-analysis of few of the comparisons - there could be numerous reasons for the source of heterogeneity, which were beyond the scope of our study to quantify.
Conclusion

1. DPP4-Inhibitors compared to Sulfonylureas when prescribed after Metformin have lower observed hazards of Myocardial Infarction and Eye related disorders.

2. Large-Scale observational data within OHDSI framework can be utilized to address clinical question and generate real world evidence at scale where RCTs are infeasible to conduct.

3. OHDSI framework enables the generation of clinical evidence in a matter of a day compared to a randomized trial, which might take years to execute with staggering cost.

4. Our analysis is an example of initial steps towards building a learning healthcare system.
1. Decide a clinical question of interest.
2. Assess if your question belong to ‘**descriptive**’, ‘**population level estimation**’ or ‘**patient level classification/prediction**’ framework of problem solving.
3. Build a **deep understanding** of amazing OHDSI tools (ATLAS, CohortMethod, PLP etc.)
4. Write a study protocol and **share** it with the community for the feedback. Be **very open** to feedback, changes and suggestions – often lot of them, which is good. (modified by James Weaver).
5. Attend any of the **OHDSI meeting**: Face to Face or OHDSI symposium and talk to community members. Go with questions.
6. Execute your study and **share the results** with the community.
7. Request other members of OHDSI community to execute your study – **they are a gem of people.**
Thank You Amazing Team OHDSI