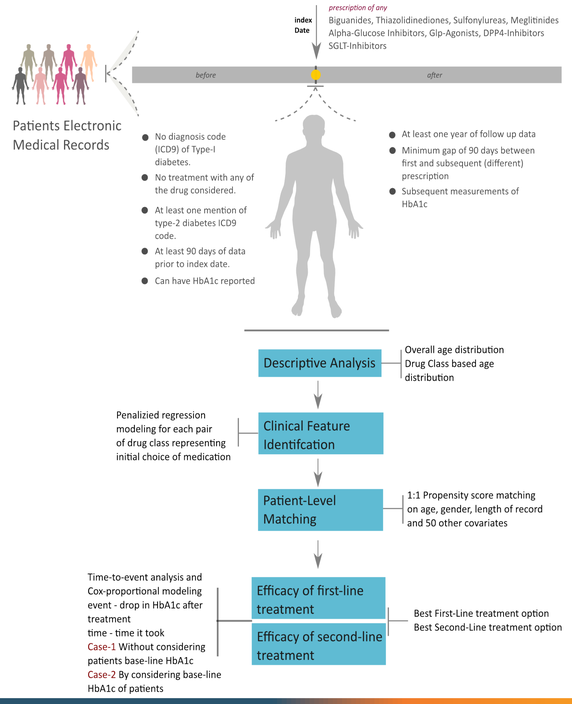
Learning Effective Clinical Treatment Pathways from Observational Data

Rohit Vashisht, Kenneth Jung, Juan Banda and Nigam H. Shah*[1]
Center for Biomedical Informatics Research, Stanford University School of Medicine, Stanford, CA, United States

Background

Treatment guidelines for control and management of type-2 diabetes mellitus (T2DM) remain controversial. Evidence from randomized clinical trials do not address many important clinical questions and are limited in their generalizability by exclusion criteria. Multiple treatment guidelines for T2DM suggest Metformin as first line medication, while the choices of second line drug remains ambiguous. A study by the Observational Health Data Science Initiative (OHDSI) found considerable variation between recommended guidelines and actual practice in T2DM. Questions pertaining to factors underlying these variations, the effectiveness of a given treatment pathway and the best second line treatment for T2DM, however remains to be addressed.

Methods



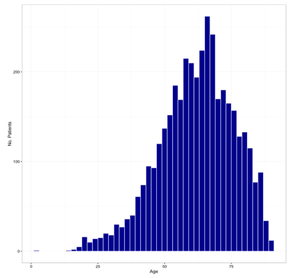
Conclusions

We recapitulate previous work regarding variation in the choice of first line therapy, and find clinical factors that are predictive of the first line therapy choice that are consistent with biomedical knowledge of adverse effects associated with metformin. Finally, we demonstrate the feasibility of comparative effectiveness studies of second line therapies in controlling HbA1c using matched cohorts that adjust for comorbidities that might impact the treatment outcome. DPP4-Inhibitors appears to be as effective as metformin as a first line therapy, and is considerably better than other options as a second line therapy. At present, our analysis is limited to data from Stanford Hospital, but could be extended to any site that has adopted the OHDSI common data model.

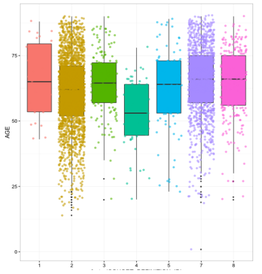
References
George Hripcsak PR, Jon Dukee, Nigam H. Shah, Rae Woong Park, Vojtech Huser, Marc A. Suchardi, Martijn Schuemie, Frank DeFalco, Adler Perotte, Juan Banda, Christian Reich, Lisa Schilling, Michael Matheny, Daniella Meeker, Nicole Pratt, David Madigan. Addressing clinical questions at scale: OHDSI characterization of treatment pathway. Proc Natl Acad Sci U S A. 2016 Jun 6. pii: 201510502.

Results

1 Overall Age Distribution

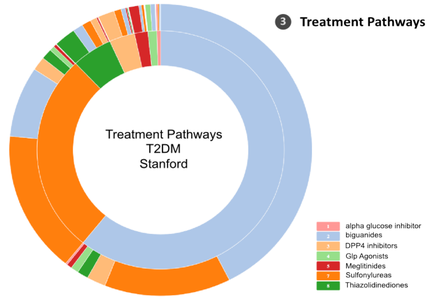


2 Drug Class Based Age Distribution

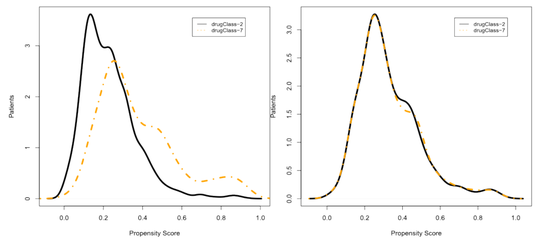


1. Alpha Glucose Inhibitor
2. Biguanide
3. DPP4 Inhibitors
4. Glp Agonists
5. Meglitinides
6. SGLT
7. Sulfonylureas
8. Thiazolidinediones

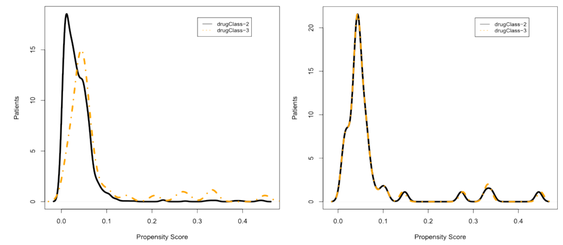
3 Treatment Pathways



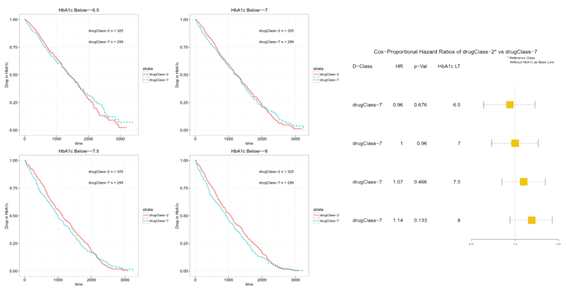
4 Propensity Score Matching of Biguanides and Sulfonylureas



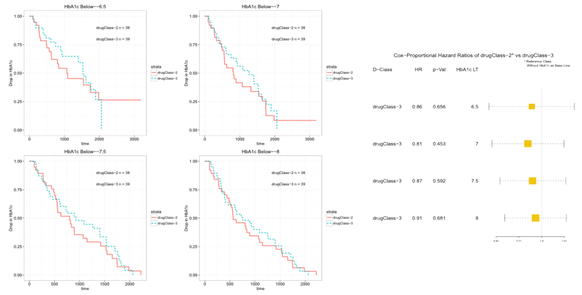
5 Propensity Score Matching of Biguanides and DPP4 Inhibitors



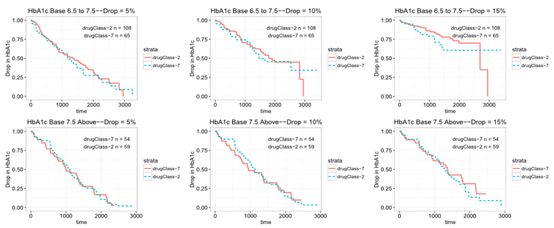
6 Time-to-Event and Cox Proportional Hazard Analysis of Biguanides and Sulfonylureas



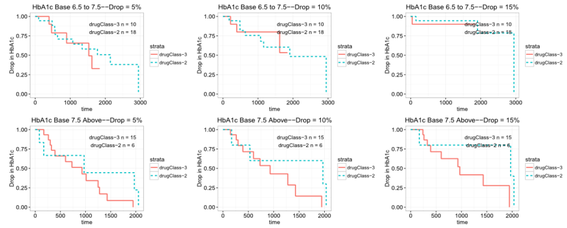
7 Time-to-Event and Cox Proportional Hazard Analysis of Biguanides and DPP4



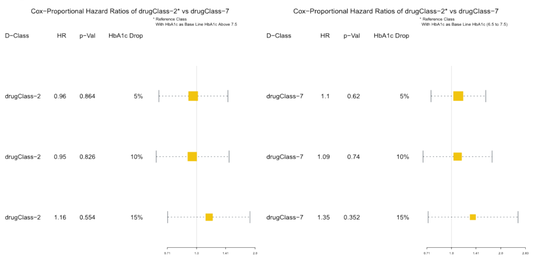
8 Time-to-Event Analysis of Biguanides and Sulfonylureas (with base-line HbA1c)



9 Time-to-Event Analysis of Biguanides and DPP4 Inhibitors (with base-line HbA1c)



10 Cox Ph Analysis of Biguanides and Sulfonylureas (with base-line HbA1c)



11 Cox Ph Analysis of Biguanides and DPP4 Inhibitors (with base-line HbA1c)