

Division of Biostatistics, IHE
Medical College of Wisconsin presents

Development and Validation of the Diabetes Outcome Model for the US (DOMUS)

By: Aaron N. Winn, PhD

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Tuesday, March 22nd | 3:30PM - 4:30PM

Purpose: The purpose of this study is to develop a diabetes outcomes model for the US (DOMUS) using a multi-ethnic, real-world-data cohort of newly diagnosed Type II diabetics that can predict outcomes for a U.S. multi-ethnic type 2 diabetes population.

Methods: The Kaiser Permanente Northern California (KPNC) Diabetes Registry, which is a well-described epidemiologic cohort with up to 13 years of follow-up from EMR and claims, were used to identify over 150,000 newly diagnosed diabetes patients between 2005-2016 with up to 13-year follow-up. The DOMUS model integrates separate, but interdependent risk equations to predict events for each of the micro and macro-vascular events, hypoglycemia, dementia, depression, and death, and predictive models for eight biomarker levels. Model accounted for static demographic factors (e.g., race), neighborhood deprivation, and dynamic factors, such as age, duration of diabetes, fifteen-possible glucose-lowering treatment combinations, biomarker levels, and history of diabetes-related events. Moreover, the models explicitly allow for a legacy effect (average A1c in the first year after diagnosis) for all outcomes.

Results: Data were randomly split into 75,000, 18,750, and 18,750 patients to perform estimation, out-of-sample calibration, and validation respectively. Model predictions in the validation sample closely aligned with the observed longitudinal trajectory of biomarkers and outcomes. Moreover, we examine the model performance within by age, race/ethnicity, and sex and found excellent predictive performance within subgroups.

Conclusion: The DOMUS Model is able to simulate event histories and biomarker trajectories that closely match observed outcomes in a real-world, multi-ethnic population of newly diagnosed diabetics. DOMUS has the potential to carry out many complex analyses that examine the effectiveness and cost-effectiveness of new medications, value of diabetes prevention, and serve as decision support tools in health care settings.



Aaron N. Winn, PhD

Aaron N Winn, PhD, Assistant Professor, Clinical Sciences, School of Pharmacy. Dr Winn's research is aimed at identifying the most effective and cost-effective treatments and ensuring that patients have access to these treatments. His research uses large databases and constructs mathematical models of disease progression to determine the comparative and cost effectiveness of treatments and policy changes and other structural factors that are associated with use of treatments. His recent work has focused factors associated with the utilization and adherence of orally administered cancer drugs. Specifically, he has examined how costs impact adherence to oral oncologics for patients with chronic myeloid leukemia and the impact on adherence of policies that aim to reduce costs for oral oncologics among privately insured patients. Additionally, he has over a decade of experience with diabetes simulation and prediction models which has been part of the evaluation of many clinical trials of new treatments for diabetes as well as policy changes associated with diabetes.

Location: WebEx | <https://mcw.webex.com/mcw/j.php?MTID=m47e217bb665b9231fd980c2e0e9fa60a>