Depression can increase the risk of cardiovascular diseases (CVDs) in patients with type 2 diabetes mellitus (T2DM).

The association between comorbid depression in type 2 diabetes to cardiovascular disease: A cohort OHDSI study

Background: In individuals with type 2 diabetes, the comorbidity of depression is a critical factor that contributes to increased cardiovascular morbidity and mortality. It has been suggested that depression in type 2 diabetes may exacerbate cardiovascular risk through pathways such as chronic inflammation, dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis, enhanced sympathetic nervous system (SNS) tone, and poorer adherence to diabetes self-care and pharmacotherapy.

Result: We analyzed data from 25,699 patients, and after PS matching (1: maximum), we obtained 700 patients for the target group and 17,451 patients for the comparator group. We examined the association between depression comorbid with the outcome of CVDs. Depression was found to be significantly associated with CVDs, with a hazard ratio of 1.65 (95% CI: 1.05, 2.51).

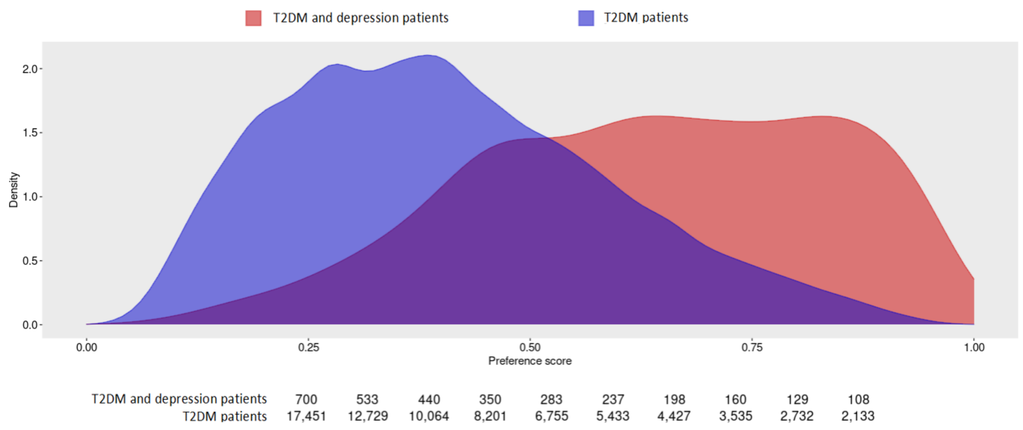


Figure 1. Preference score distribution. The preference score is a transformation of the propensity score that adjusts for differences in the sizes of the two treatment groups.

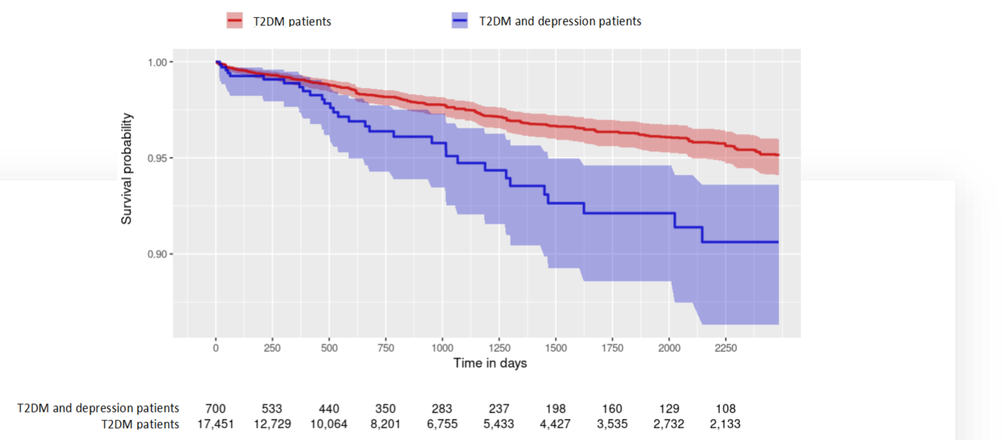


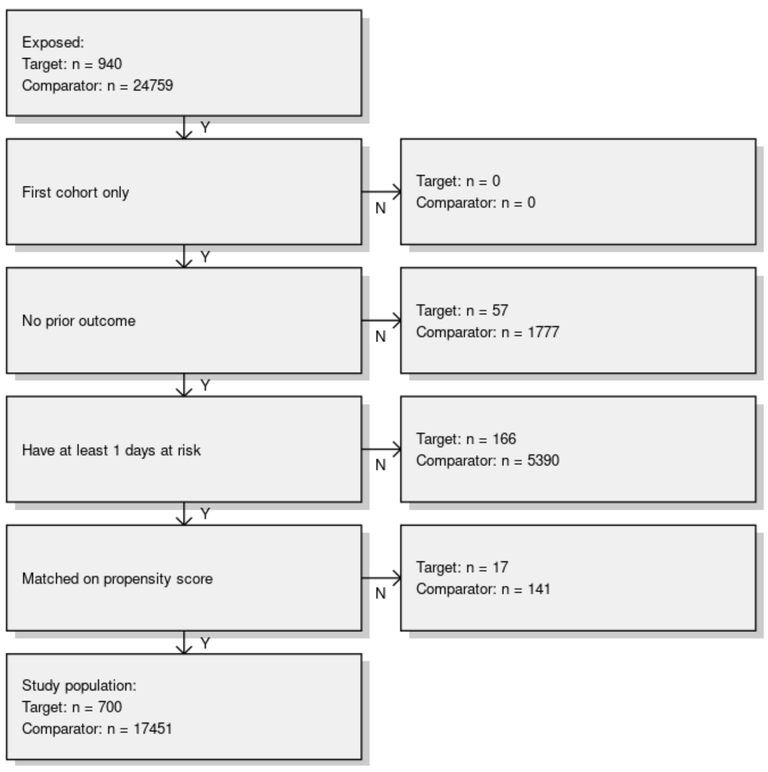
Figure 2. Kaplan Meier plot, showing survival as a function of time. This plot is adjusted using the propensity score: The target curve (*T2DM patients with Depression)* shows the actual observed survival. The comparator curve (*T2DM patients*) applies reweighting to approximate the counterfactual of what the target survival would look like had the target cohort been exposed to the comparator instead.

Methods

Data source

The data (approximately 4.3 million) from 3 affiliated hospitals (TMU Hospital, Wanfang Hospital, and Shuang Ho Hospital) were mapped to the OMOP CDM for 2008-2022.

Figure 3. Attrition diagram, showing the Number of subjects in the target (*T2DM patients with Depression*) and comparator (*T2DM patients*) group after various stages in the analysis.

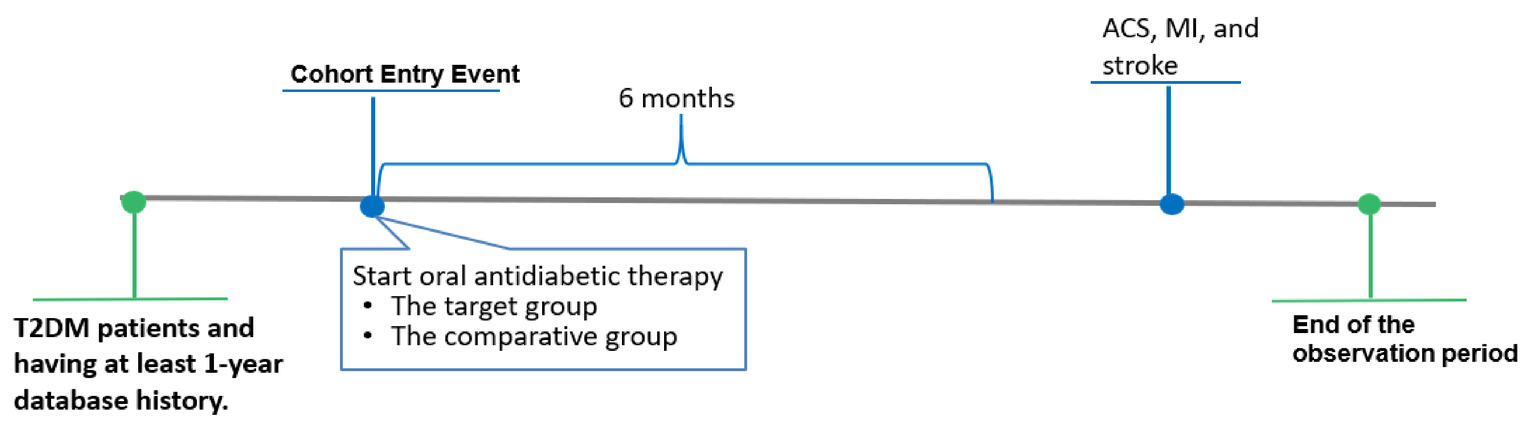


Cohort construction

The comparative group consisted of T2DM patients without depression diagnosis and depression medication. The target group consisted of T2DM patients who had a depression diagnosis and depression medication after the first DM medication. The outcome is the cardiovascular (CVD) events consisting of the occurrence of acute coronary syndrome (ACS), myocardial infarction (MI), and stroke events. The cohort end date will be based on continuous exposure to 'Oral DM Medication.'

Analysis methods

The time-to-event outcome among patients in the target and comparator cohorts is determined by calculating the number of days from the start of the time-at-risk window (at least 6 months after the cohort start date), until the earliest event among 1) the first occurrence of the outcome and 2) the end of continuous observation. We remove subjects that have the outcome prior to the risk window start.



Limitation: Furthermore, after refining the findings using negative control outcomes, the effect size estimates were recalibrated, revealing no significant difference in the hazard of insulin initiation after calibration. This recalibrated outcome indicates a hazard ratio of 0.87 (95% CI: 0.55, 1.38), suggesting that the observed connection between depression and insulin initiation may be more complex than initially thought, possibly influenced by unmeasured confounding factors.

Christianus Heru Setiawan, Daniel C.A. Nugroho, Phan Thanh-Phuc, Septi Melisa, Muhammad Solihuddin Muhtar, Nguyen Phung-Anh, Jason C. Hsu