Disease progression of heart failure in type 2 diabetes patients in Germany; a real world data analysis using health insurance claims data

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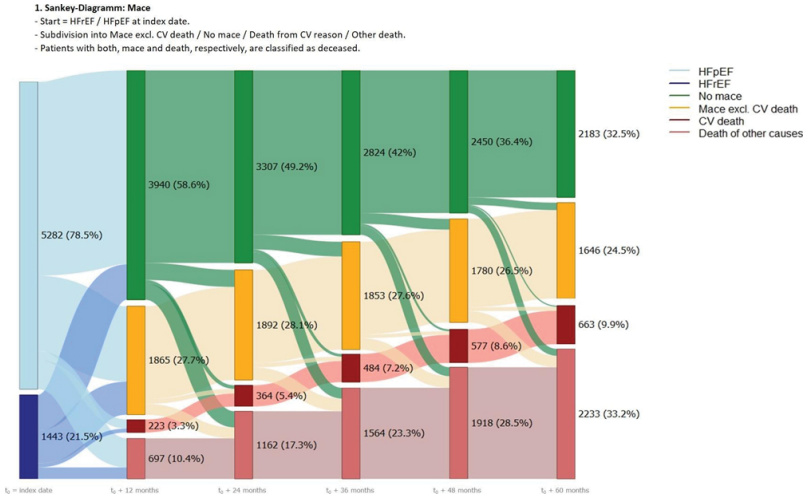
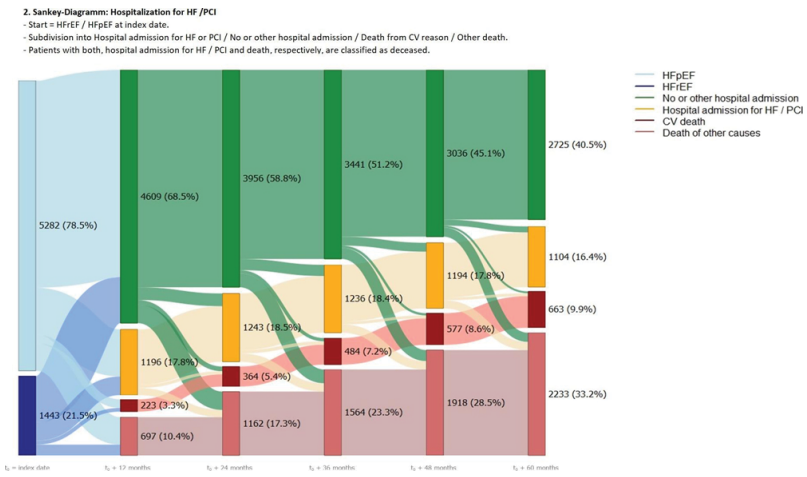
Individuals with Type 2 Diabetes (T2D) show two- to four-fold increased risk of Heart failure (HF). Given the increasing T2D prevalence in Germany, researching the interaction of T2DM and HF is of high importance. HF still progresses rapidly. Left ventricular ejection fraction (LVEF) plays an important role in understanding disease progression. Commonly, LVEF is being distinguished into three categories: HF with preserved LVEF (HFpEF), HF with moderate reduced LVEF (HFmEF) and HF with reduced LVEF (HFrEF). In Germany there are no recent data on disease progression in HF especially according to LVEF categories. Purpose of this study is to a) measure how many T2DM patients acquire HF over two years; b) understand the progression of HF in these patients in a five-year follow-up; and c) visualize disease progression with Sankey plots.

We used insurance claims data from German Statutory Health Insurances (SHI). As LVEF category is not included in these data, a model was used to classify patients into HFrEF or HFpEF (with omitting the HFmEF category due to better statistical performance of a binary model). The model was derived from a set of 34 proxy variables (disease coding, interventions, drug prescriptions). Selection period for T2D patients is 2013. Inclusion period was 2014–2015, follow-up 2016–2020. Baseline characteristics include demographic data, disease stage, comorbidities, and risk factors. Follow-up criteria were MACE (including hospital admission) changes in LVEF category and mortality. 173,195 individuals with T2D were identified in 2013, median age 66 yrs. 6,725 (3.88% of the overall sample) developed HF in 2014 or 2015, median age 74 yrs. As Sankey plot visualizations show, 34.4% of the patients had MACE over the course of five years; 24.5% were still alive and 9.9% died from CV-death. Further 33% died of other causes. Myocardial infarct was the most common MACE, followed by stroke (32%), hospital admission for HF (28%) and CV death (7%). 40% of patients were never admitted to a hospital over the study period. Exploratory analyses identified 5,282 HFpEF patients (78.54%) and 1,443 HFrEF patients (21.46%). Survival after 5 years in HFpEF patients was 71%, in HFrEF patients 29%. After five years 3,430 (90%) surviving patients were still in HFpEF and 399 (10%) in HFrEF.

This analysis provides disease progression insights in T2D patients who developed HF in Germany. The sample is representative for the country and numbers can be extrapolated to the overall German SHI population. A significant number of patients die within 5 years of initial diagnosis. As echo diagrams are not available in German insurance claims, validity of the predicted LVEF cannot be assessed. Further research featuring real world LVEF score validation would be highly desirable. Beyond therapeutic care, digital solutions for closer monitoring of these patients may improve the outcome of these patients.





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