



An Effective Treatment Pathways Study for Type-2 Diabetes

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Abstract

This paper cleaned, transformed and imported EMR data into OMOP CDM using distributed network and Observational Health Data Sciences and Informatics (OHDSI) tools. The treatment pathways were analyzed retrospectively, and the effects of the four medications most commonly used in the second-line therapy after the first-line of metformin recommended by the guidelines were compared emphatically. The conclusion would be one of the bases for the selection of clinical treatment in the future.

Introduction

Diabetes, the fourth leading cause of death in the global population, has become a major problem and challenge in health care. In 2017, approximately 425 million adults (20 to 79 years) were living with diabetes; by 2045 this will rise to 629 million [1]. As the incidence of diabetes is increasing year by year, the world attaches great importance to the prevention, diagnosis and treatment of diabetes and its complications. The latest epidemiological study shows that the prevalence rate of diabetes in China is as high as 10.4% [2]. By 2017, the total number of adults with diabetes in China was about 144 million [1]. China has become the country with the largest diabetes population.

Patients with Type 2 Diabetes (T2D) typically use several drug treatments during their lifetime. There is a debate about the best second-line therapy after metformin mono therapy failure due to the increasing number of available anti diabetic drugs. Therefore, more and more attention has been paid to the comparison of second-line treatment for diabetes [3,4].

In contrast, clinical care knowledge obtained through Electronic Medical Records (EMRs) has opened a new era of learning about health systems that can provide evidence for medical decision-making [5]. Observational Health Data Sciences and Informatics (OHDSI) is an interdisciplinary collaboration undertaken by a multi-stakeholder group to discover the value of observational health data through large-scale analysis [6]. In previous study, Hripcsak analyzed treatment pathways for T2DM [7]. The study found the heterogeneity in the prescription of second-line agents. Rohit performed a systematic analysis of treatment-pathways in T2DM using data collated in Stanford's clinical data warehouse [8]. He compared the efficacy of different second line therapies, and found that sitagliptin was considerably better than other options as a second line therapy. At present, we would like to verify the data in China and find the drug law of type 2 diabetes in China, and compare the effect of several commonly used drugs in the second line of medication.

Methods

Data concerning basic characteristics, diagnoses, test, and medications of 6,230,000 patients from January 1st, 2005 to December 31st, 2015 were extracted from the Clinical Data Repository (CDR) of the First Affiliated Hospital of Nanjing Medical University, and went through privacy-free and cleaning treatment to map an Observational Medical Outcomes Partnership Common Data Model (OMOP CDM; Ver.5.0) [6]. Patient satisfying the following terms were selected for our study cohort in Figure 1. The index date of each patient was defined as the date of the first prescription of any of the drugs considered in this study following at least one mention of a T2DM ICD10 code. Patients were required to have at least 90 days of data prior to their index date. Patients

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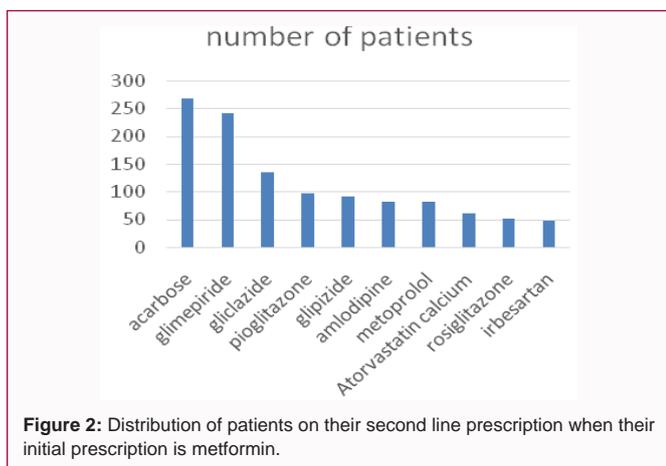
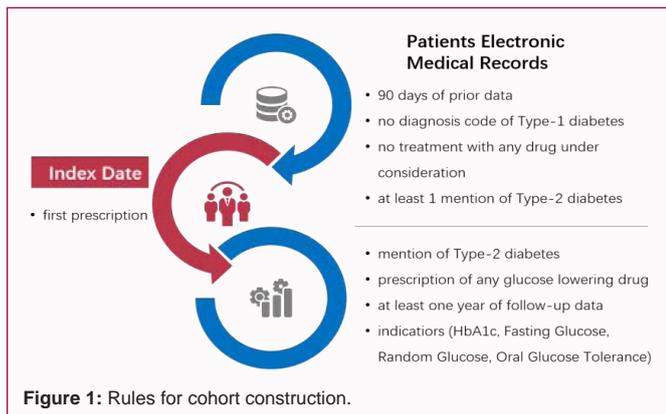
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were also required to have at least one HbA1c measurement following their index date to be included in the analysis of treatment pathway efficacy.

The cohort consisted of 25,619 patients. The gender distribution of patients was observed approximately even, with 11,077 females and 14,542 male.

Results

Among the patients use metformin as their first medication in cohort, the distribution of their second line prescription is shown in Figure 2. The most common four medications are acarbose, glimepiride, gliclazide and pioglitazone. We will further analyze the survival curves of these four treatments.

Conclusion

We will establish Cox proportional hazard models adjusted for age and gender using data of patients. These patients used metformin

on the first line medication, and then they switched to acarbose, glimepiride, gliclazide or pioglitazone as their second line medication. We will compare the efficacy of these four treatment pathways by the Cox proportional hazard models.

Based on OMOP CDM, this study retrospectively analyzed the EMR data of our hospital. Under the distributed architecture of OHDSI, this research protocol and model will be easily transplanted to any OHDSI data site. The common data model will be continuously promoted in the future, so that we can form larger and more universal research results, and provide some basis for the second line medication of type 2 diabetes.

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