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Personalised treatment targets in type 2 diabetes patients: The Dutch approach

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ABSTRACT

Aims: To compare the proportion of cardiometabolic well-controlled type 2 diabetes mellitus (T2DM) patients according to a clearly defined, simple personalised approach, versus the 'one-size-fits-all' approach.

Methods: Observational study using routine data of primary care type 2 diabetes patients in the Netherlands. The proportions of patients that reach the targets for HbA1c, systolic blood pressure and low-density lipoprotein cholesterol in the two different approaches were compared.

Results: Of the 890 patients (54.7% men, mean age 62.7 years), 31.8% were well-controlled according to the individualised approach and 24.8% according to the 'one-size-fits-all' approach. For specific subgroups personalising the treatment led to a 5.2%, 27.3% and 45.6% increase of patients achieving low-density lipoprotein cholesterol, HbA1c and systolic blood pressure goals respectively.

Conclusions: A clearly defined and relatively simple personalised approach leads to a higher proportion of T2DM patients considered as cardiometabolic well-controlled. This approach may especially be beneficial for patients aged ≥70 years on more than metformin monotherapy (HbA1c) and for patients aged ≥80 years (SBP). Precisely these patients are suggested not to benefit from stricter HbA1c or SBP targets, whereas they may experience more adverse effects (e.g. hypoglycaemia, postural hypotension) when a stricter target value is pursued.

1. Introduction

It appears difficult for patients with type 2 diabetes (T2DM) to reach treatment targets for glycaemic control, blood pressure and lipids. In a Dutch primary care population only 18.9% of them achieved good cardiometabolic control [1], with corresponding percentages of 6.5% and 16.2% in a European and United Kingdom region sample respectively [2,3]. In the Netherlands and in other countries as well, general

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practitioners (GPs) are financially remunerated for the number of patients that reaches diabetes treatment targets. It remains questionable whether the pay for performance programme in the United Kingdom (Quality of Outcomes Framework) really resulted in an increase in patients on target and in a quality improvement; the suggested improvement could be the result of an increased exception reporting, i.e. excluding patients with inappropriate target achievement because e.g. informed dissent [4], which is not a desirable situation. A possible solution to this could be the use of personalised treatment targets. Personalising treatment goals in an evidence-based manner may therefore not only be of interest for patients and health care providers, but also for health insurance companies. In this respect it may be relevant to have insight in the proportion of patients that could reach appropriate personalised targets with most health gain and least adverse effects.

During the last decade, several studies have been conducted to determine whether intensive glucose control led to a decrease in microvascular and macrovascular complications [5–8]. These studies found a decline in (the progression of) microvascular complications; the effect on macrovascular complications remained uncertain and controversial [5–8]. Moreover, some patients appeared not to benefit from a stricter HbA1c target, whereas they experienced more adverse effects (e.g. hypoglycaemia) when a stricter target value was pursued [9]. Partially based on the results of the above mentioned trials, the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD) recommend an personalised glycaemic treatment target, in which both clinical characteristics and psycho-socio-economic factors should be taken into account [9,10]. However, this recommendation is not clearly defined and there is no universally accepted approach on how to personalise targets. Since then, different personalising strategies have been proposed [11,12]. Nonetheless, the abundant number of factors to take into account in these strategies is time-consuming and hence difficult to implement in daily practice. Compared to the abovementioned strategies, the Dutch guideline for the treatment of hyperglycaemia in T2DM patients recommends a clearly defined personalised approach in which age, medication use and diabetes duration have to be taken into account [13]. Because strict glycaemic control leads to net harm in older T2DM patients, the Dutch guideline has proposed a less strict glycaemic target for patients >70 years [5,9,13,14]. Only for patients aged >70 years with metformin monotherapy or lifestyle advice only, an unaltered HbA1c target ≤53 mmol/mol (≤7%) is aimed for, since both strategies are relatively safe and are unlikely to cause harm [14]. For patients who use potentially harmful medication, a less strict target is used. Because intensive treatment is more likely to have benefits in the first years after the diagnosis of T2DM, the less strict target is set for patients >70 years who use more than metformin monotherapy or lifestyle advice only, and have a diabetes duration of more than 10 years [8,9,13,14].

For T2DM patients, intensive antihypertensive treatment (targeting at a systolic blood pressure (SBP) <120 mmHg) shows no additional reduction in risk of cardiovascular diseases (CVD), compared to antihypertensive treatment targeting at a SBP of <140 mmHg [15]. Among elderly T2DM patients, there is an inverse association between blood pressure levels and mortality, whereas treating an SBP >160 mmHg in this population showed to be beneficial [16–20]. Elderly patients are therefore suggested not to benefit from a stricter SBP target, whereas they may experience more adverse effects (e.g. postural hypotension) when a stricter target value is pursued [17,21]. For that reason the Dutch guideline suggests personalisation of blood pressure goals based on the age (80 years) [22].

While there is no consensus on exactly when lipid-lowering therapy in T2DM patients should be initiated, lipid-lowering therapy has greater benefits in patients who are at risk for developing CVD [23–25]. The Dutch guideline advises to start primary prevention with a statin based on the absolute 10-years risk of CVD, but only when the low-density lipoprotein (LDL) cholesterol level is >2.5 mmol/L [22].

We aimed to exactly compute the proportion of patients that meets their individual optimal treatment targets, compared to the 'one-size-fits-all' approach.

2. Methods

2.1. Setting

This observational cross-sectional study was conducted in T2DM patients recruited from four primary care centres in the Netherlands, covering 35,675 patients, with 25 GPs. Compared to the general Dutch population, the proportion of patients with Western-European ethnicity is lower, as is the proportion of people aged >70 years. Patients were included if they were treated for their diabetes in primary care and data on all three treatment targets (HbA1c, SBP and LDL-cholesterol) were available. Patients were excluded if medical specialists treated them for their diabetes because routine data of these patients were not available in the electronic medical records of the GP. The same holds for patients who refused all diabetes care or did not show up for diabetes monitoring visits in the past year. These patients were excluded as well.

2.2. Data collection

For the identification of T2DM patients, the International Classification of Primary Care (ICPC) code for T2DM (T90.02) was used [26]. Data on age, gender, duration of diabetes, current diabetes treatment (lifestyle advice, blood glucose lowering and lipid-lowering medication), smoking status, body mass index (BMI), SBP, HbA1c, LDL- cholesterol, albumin/creatinine ratio (ACR) and estimated glomerular filtration rate (eGFR) were retrieved from the electronic medical records in August 2014. Macrovascular diseases were classified as present if angina pectoris, myocardial infarction, chronic ischaemic heart disease, transient ischaemic attack, cerebral infarction, intermittent claudication or aortic aneurysm were recorded.

2.3. Targets

The target levels for the 'one-size-fits-all' approach were defined as HbA1c ≤53 mmol/mol (≤7%), SBP ≤140 mmHg and LDL ≤2.5 mmol/L, according to the Dutch guidelines before their revision in 2013 [27]. According to the personalised

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