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Original research article

Impact of intervention on metabolic outcomes among dropouts with type 2 diabetes

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ABSTRACT

Purpose: The aim of this study was to evaluate the effect of an individual intervention given by health care professionals to dropouts with type 2 diabetes (T2D) on their metabolic profile.
Materials/methods: In 2010, we identified 356 T2D dropouts in Vantaa Health Centre, Finland. At the baseline visit the participants' status was assessed including laboratory tests. Diabetes counseling was given, and drug treatment was enhanced when needed. The follow-up visit was performed 13 to 30 months later including the same assessments as performed at the baseline visit. The dropouts who attended the follow-up visit formed the study group. One third (n = 115) of the dropouts participated in the follow-up visit.
Results: The study participants (mean age 61.4 years) were older than the non-participants (mean age 58.5 years) (p = 0.009). After the intervention the proportion of participants with hemoglobin A1c ≥ 9% (75 mmol/mol) decreased from 15.5% to 5.2% (p = 0.004). Improvements were also observed in general in hemoglobin A1c, from 6.6% (49 mmol/mol) to 6.3% (45 mmol/mol) (p = 0.001), in total cholesterol, from 4.9 mmol/l to 4.5 mmol/l (p = 0.011), in low-density lipoprotein cholesterol, from 2.9 mmol/l to 2.6 mmol/l (p = 0.015) and in diastolic blood pressure, from 90 mmHg to 84 mmHg (p = 0.001).
Conclusions: Dropouts with T2D were difficult to bring back to the public health care system, especially men under the age of 60 years. Dropouts who participated in the intervention showed improvements in several metabolic outcomes.
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Key messages

- Dropouts with T2D are difficult to bring back to diabetes care.
- Men younger than 60 years seem to be at high-risk to drop out from public diabetes care.
- An individual intervention improved several metabolic outcomes.

1. Introduction

Globally, the burden of type 2 diabetes (T2D) is increasing [1]. The general treatment goal is to prevent acute complications, reduce the risk of long-term diabetic complications including micro- and macro-vascular complications as well as to ensure an optimal quality of life [2]. Treatment of T2D involves both lifestyle modifications and drug treatment.

A proportion of the patients with T2D does not attend diabetes clinics as prescribed by the health care personnel. The underlying reasons for dropout differ, e.g. long distance to the clinic, multi morbidity, treatment goals requiring lifestyle changes, patients' age and gender [3,4]. Potentially, these dropouts are exposed to an increased risk for diabetic complications further influencing their quality of life and increasing the costs of diabetes treatment for society.

Abbreviations: BP, blood pressure; HbA_{1c}, hemoglobin A1c; HDL, high, density lipoprotein; IRQ, interquartile range; LDL, low-density lipoprotein; SD, standard deviation; T2D, type 2 diabetes.

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In the public primary health care center of the city of Vantaa, Finland, we investigated the phenomenon of dropout. In 2009, every tenth patient with T2D was a 'dropout' from the public primary diabetes care system [5]. Among these patients, the level of hemoglobin A1c (HbA_{1c}) was satisfactory whereas low-density lipoprotein (LDL) cholesterol and blood pressure (BP) were non-optimal [5]. Our aim was to attach these dropouts back to the diabetes care system and enhance their treatment when needed. The purpose of this study was to evaluate the effect of a 'real-life' intervention given by health care professionals to the dropouts with T2D on their metabolic profile.

2. Methods

2.1. Study population

A detailed description of the patients with T2D, who were dropouts from diabetes care within the public primary health care system, has been published recently [5]. Briefly, we identified dropouts with T2D aged 18–80 years from diabetes care in public primary health care by using computer aided search from an electric patient record system (Finstar) in the Eastern districts of the city of Vantaa, Finland. Patients fulfilled the criteria for dropout, if they during the years 2005–2009 had an ICD-10 code including an E11 code or if they used T2D specific medication and they had not contacted the public primary health care system during the year 2009. All together, we were able to identify 356 dropouts (10.3% of patients with T2D in Eastern Vantaa). Trained diabetes nurses contacted and interviewed the dropouts by telephone, and invited them to a baseline outpatient and laboratory visit within the public health care system. Of the contacted dropouts, 66.3% (of whom 60.6% were men and 39.4% were women) came to the baseline visit and 84.8% (of whom 58.9% were men and 41.1% women) had laboratory tests taken.

The follow-up visit took place 13 to 30 months after the baseline visit either as a visit to a trained diabetes nurse or to a general practitioner at the primary health care center. Those dropouts, who came to the follow-up visit, composed the study group in this present study (n = 115). Fig. 1 shows the study flowchart.

2.2. Measurements

At the baseline visit the following characteristics were recorded: age, gender, height, weight, BP, duration of T2D, signs of proteinuria and/or retinopathy, and diabetes medication as well as marital status, occupation and comorbidities based on ICD-10 diagnoses. Further, at baseline the following laboratory tests were performed HbA_{1c}, total cholesterol, LDL −cholesterol, high-density lipoprotein (HDL) −cholesterol and triglycerides. Of the dropouts, a detailed description of the baseline characteristics of the dropouts with T2D has been published previously [5]. At the baseline visit the intervention was given in the following way: trained diabetes nurses counseled the participants individually aiming at better self-management behavior and if needed, the general practitioners of the health care center enhanced diabetes drug treatment.

At the follow-up visit the participants' weight; blood pressure and diabetes medication were recorded. Further, the participants were asked to visit the laboratory for the same laboratory tests as performed at the baseline visit.

The ethics committee of the Hospital District of Helsinki and Uusimaa, and the health authority of the Vantaa city have approved the study.

Statement of Informed Consent: This study is an observational retrospective register based cohort study based on an electric patient record system; we assessed the effects of the work performed by the community primary health care nurses and general practitioners. The investigators 'per se' did not contact the dropouts. According to the ethics committee of the Hospital District of Helsinki and Uusimaa, and the health authority of the city of Vantaa the patients do not need to have the Statement of Informed Consent.

2.3. Statistical analysis

Data are reported as percentage (number) or mean (standard deviations [SD]) or median (interquartile range [IRQ]). Percentage differences were tested using cross-tabulation and Chi-Square test or McNemar test. Comparisons were carried out by Mann-Whitney *U* test or by independent samples T-test between the study participants and the non-participants. Comparisons were carried out by Wilcoxon signed rank test or paired samples T-test was used when comparing the results from the baseline and the follow-up visit. Statistical analyses were carried out using IBM SPSS, version 22.0 (IBM, Armonk, NY, USA). A p-value of less than 0.05 was considered statistically significant.

3. Results

About one third (n = 115) of the dropouts participated in the follow-up visit. The characteristics of the study participants and non-participants are presented in Table 1. For the classification of the dropouts' glycemic control (HbA_{1c} level), the following

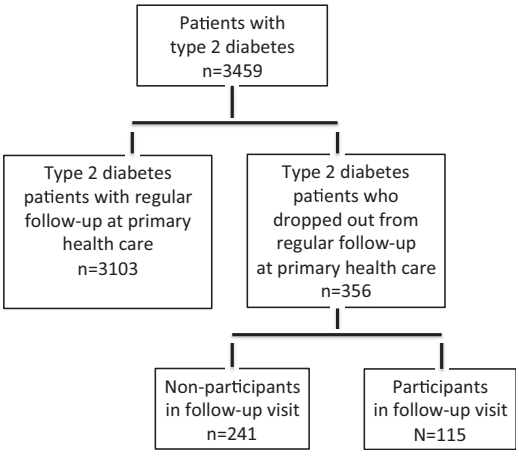

Fig. 1. Study flowchart.

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