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Type 1 diabetes in adults: modern treatment and risk of major coronary events

Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademin, Göteborgs universitet kommer att offentligen försvaras i Kammaren, Vita stråket 12, Sahlgrenska universitetssjukhuset, den 9 februari, klockan 13:00

av Viktorija Matuleviciene Anängen

Fakultetsopponent:

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Avhandlingen baseras på följande delarbeten

I. Matuleviciene V, Attvall S, Ekelund M, Clements M, Dahlqvist S, Fahlén M, Pivodic A, Haraldsson B, Lind M. A Retrospective Study in 5,989 Patients with Type 1 Diabetes in 10 Outpatient Diabetes Clinics in Sweden of the Frequency of Measuring HbA1c in Clinical Practice. J Diabetes Metab. 2014;5:377

II. Matuleviciene V, Joseph JI, Andelin M, Hirsch IB, Attvall S, Pivodic A, Dahlqvist S, Klonoff D, Haraldsson B, Lind M. A Clinical Trial of the Accuracy and Treatment Experience of the Dexcom G4 Sensor (Dexcom G4 System) and Enlite Sensor (Guardian REAL-Time System) Tested Simultaneously in Ambulatory Patients with Type 1 Diabetes. Diabetes Technol Ther. 2014;16(11):759-67

III. Clements M, Matuleviciene V, Attvall S, Ekelund M, Pivodic A, Dahlqvist S, Fahlen M, Haraldsson B, Lind M. Predicting the effectiveness of insulin pump therapy on glycemic control in clinical practice: A retrospective study of patients with type 1 diabetes from 10 outpatient diabetic clinics in Sweden over 5 years. Diabetes Technol Ther. 2015;17(1):21-8.

IV. Matuleviciene-Anängen, V., Rosengren, A., Svensson, A. M., Pivodic, A., Gudbjörnsdottir, S., Wedel, H., Kosiborod, M., Haraldsson, B., Lind, M. (2017). Glycaemic control and excess risk of major coronary events in persons with type 1 diabetes. Heart 2017;103:1687-1695.

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Type 1 diabetes in adults: modern treatment and risk of major coronary events

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Abstract

Background: According to the National Diabetes Register (NDR) report (2016), 21.2% of adults with type 1 diabetes (T1D) achieve glycaemic targets measured with HbA1c (52 mmol / mol) and 20.1% of patients have very poor glycaemic control (HbA1c> 70 mmol / mol). In recent years, a positive trend in improving HbA1c has been observed; despite it, there is a great need to understand how diabetes care can be improved. Thus, the following questions were formulated: To what extent are international guidelines for visits with HbA1c controls in T1D followed? (Study I) Which of the two most commonly used CGM sensors is most accurate in estimating blood glucose levels and which CGM system is most user-friendly? (Study II) Can some patient subgroups have greater effect on insulin pump treatment than others? (Study III) What is the excess risk of acute coronary events for persons with T1D compared to persons without T1D in Sweden, when modern guidelines have been implemented? How does this risk differ for people with T1D in relation to glycaemic control and renal complications? (Study IV)
Material and methods: To calculate the HbA1c yearly measurement rate, we included patients from 10 diabetes clinics in Sweden. Data were collected via the Diab-Base electronic record system (study I). Persons with T1D and insulin pump use for at least 5 years who had HbA1c measurement at the beginning and end of the period and patients with insulin injections were included from Dia-Base in study III. In an economically independent clinical trial on precision and treatment satisfaction with 2 different CGM (Dexcom G4 and Enlite) systems, ambulatory patients with T1D were included (study II). All patients arrived at three scheduled visits for blood sampling and filled in a questionnaire regarding treatment satisfaction. In a study of risk of myocardial infarction in persons with T1D compared to controls (study IV), we included patients registered in NDR (n = 33 886) and 5 randomly selected matched controls (n = 169 223). Through interaction with data from the National Board of Social Services, data were collected on cardiovascular disease, death date and causes of death.
Results and conclusions: Persons with T1D, get fewer than 2 HbA1c controls per year on average in Sweden against recommended 4 controls per year. Patients with insulin injections receive fewer HbA1c controls and need extra focus (study I). We found that DexCom G4 had a higher precision and treatment satisfaction, which is likely to make adequate decisions on treatment (study II). We found no strong predictors for the greater effect of insulin pump on lowering HbA1c. The decrease was 2.5 mmol / mol at very high HbA1c compared with about 2 mmol / mol on average. However, insulin pump treatment has a value since a certain decrease in HbA1c occurs (study III). Persons with T1D had about 4 times the risk of cardiac infarction than persons without diabetes in Sweden. The risk is significantly lower for people with good glycaemic control and absence of renal complications. Continued focus on better methods for improving HbA1c, as well as primary and secondary prevention of coronary artery disease are essential for reducing the risk of coronary complications in T1D.

Keywords: Diabetes, type 1, HbA1c, CGM, insulin pump, major coronary events

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