

# Diabetes and hypertension – entangled chronic conditions in primary care

## Time trends and determinants for mortality and cardiovascular complications

Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademien, Göteborgs universitet kommer att offentlig försvaras i hörsal Arvid Carlsson, Medicinaregatan 3, fredagen den 16 april 2021, klockan 13.00

av Tobias Andersson

Fakultetsopponent:

Professor Anders Halling

Lunds universitet, Sverige

### Avhandlingen baseras på följande delarbeten

- I. **Andersson T**, Hjerpe P, Carlsson AC, Pivodic A, Wändell P, Manhem K, Bengtsson Boström K. Mortality trends and cause of death in patients with new-onset type 2 diabetes and controls: A 24-year follow-up prospective cohort study. *Diabetes Research and Clinical Practice*. 2018;138:81-89
- II. Pikkemaat M, **Andersson T**, Melander O, Chalmers J, Rådholm K, Bengtsson Boström K. C-peptide predicts all-cause and cardiovascular death in a cohort of individuals with newly diagnosed type 2 diabetes. The Skaraborg diabetes register. *Diabetes Research and Clinical Practice*. 2019;150:174-183
- III. **Andersson T**, Pikkemaat M, Schiöler L, Hjerpe P, Carlsson AC, Wändell P, Manhem K, Kahan T, Hasselström J, Bengtsson Boström K. The impact of diabetes, education and income on mortality and cardiovascular events in hypertensive patients: A cohort study from the Swedish Primary Care Cardiovascular Database (SPCCD). *PLoS One*. 2020;15:e0237107
- IV. **Andersson T**, Pikkemaat M, Schiöler L, Hjerpe P, Carlsson AC, Wändell P, Manhem K, Kahan T, Bengtsson Boström K. Country of birth and mortality risk in hypertension with and without diabetes: the Swedish Primary Care Cardiovascular Database. *Journal of Hypertension*. 2020 December 5, Online ahead of print.

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## **Time trends and determinants for mortality and cardiovascular complications**

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### **Abstract**

Diabetes and hypertension are chronic, often coexisting conditions with increased risk of premature death and cardiovascular complications. This thesis aimed to study different epidemiological aspects regarding risk of mortality and cardiovascular complications among individuals with diabetes, hypertension, and hypertension with concomitant diabetes in primary care.

The thesis includes four cohort studies. In Study I, people with new-onset type 2 diabetes registered in the Skaraborg Diabetes Register (SDR) 1991–2004 were followed until 2014 to assess causes of death and mortality trends compared to controls from the population, and in Study II to evaluate C-peptide as a predictor of mortality and cardiovascular complications. In Study III, people with hypertension registered in primary care and included in the Swedish Primary Care Cardiovascular Database (SPCCD) 2001–2008 were followed until 2012 to estimate the risk of mortality and cardiovascular complications with regard to diabetes status, educational level and income, and in Study IV with regard to diabetes status and country of birth.

In the SDR, excess mortality was driven by cardiovascular and endocrine causes of death and decreased by 2% per calendar year of diagnosis 1991–2004. Also, C-peptide was associated with risk of all-cause and cardiovascular mortality. In the SPCCD, diabetes and low income versus no diabetes and high income was associated with almost 4-fold increased risk of mortality and 2-fold risk of myocardial infarction and stroke. Compared to Swedish-born, Non-European country of birth was associated with decreased risk and being born in Finland with increased risk of mortality.

In conclusion, excess mortality in patients in Skaraborg with type 2 diabetes has decreased. In diabetes and hypertension, socioeconomic factors and C-peptide are associated with risk of mortality and cardiovascular complications and could potentially be used to identify patients at high risk of adverse outcomes, to allocate health care resources, and to strengthen individual risk factor control with the aim to improve prognosis.

**Keywords:** Diabetes mellitus, hypertension, C-peptide, mortality, cause of death, myocardial infarction, stroke, cohort studies, primary health care, socioeconomic factors, emigrants and immigrants, Sweden

ISBN: 978-91-8009-226-5 (TRYCK)

<http://hdl.handle.net/2077/67335>

ISBN: 978-91-8009-227-2 (PDF)