Cardiovascular disease and diabetes or renal insufficiency: the risk of ischemic stroke and risk factor intervention

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Akademisk avhandling

som med vederbörligt tillstånd av Dekanus vid medicinska fakulteten Umeå universitet för avläggande av medicine doktorsexamen framläggs till offentligt förvar i Hörsalen, Östersunds sjukhus, fredagen den 6 november, kl. 09:00.
Avhandlingen kommer att förvaras på svenska.

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**Title**
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**Abstract**

**Aim:** The aim of this thesis was to define the risk of ischemic stroke after an acute myocardial infarction (AMI) in high-risk patients with diabetes mellitus (DM) or chronic kidney disease (CKD). Furthermore, to assess whether nurse-based secondary preventive follow-up after cardiovascular disease (CVD) improves risk factor values in patients with DM or CKD and to investigate if this method performs better than usual care to implement a new treatment guideline in DM patients.

**Methods:** To assess the risk of post-AMI ischemic stroke, patient data were obtained from the Swedish Register of Information and Knowledge about Swedish Heart Intensive Care Admissions (RIKS-HIA). In separate studies, we compared a total of 173,233 AMI patients with and without DM, and 118,434 AMI patients with and without CKD. The nurse-based age-independent intervention to limit evolution of disease (NAILED) trial investigated a new cardiovascular secondary preventive follow-up protocol. Patients with acute coronary syndrome, stroke, or transient ischemic attack were randomized to receive either nurse-based telephone follow-up (intervention) or usual care (control). Low-density lipoprotein (LDL-C) levels and blood pressure (BP) were measured at 1 month (baseline) and 12 months post-discharge. Intervention patients with above-target baseline values received physician directed medication titration to achieve treatment goals, while the measurements for control patients were forwarded to their general practitioners for assessment. We compared LDL-C level and BP at 12 months post-discharge between 225 intervention patients and 215 control patients with concurrent DM or CKD. During the course of the NAILED trial, new secondary preventive guidelines for DM patients were released, including a new LDL-C target value. To assess adherence to the new guidelines within the NAILED trial, we compared LDL-C levels in the 101 intervention patients and 100 control patients with DM.

**Results:** The rates of ischemic stroke one year after an AMI decreased over time, from 7.1% in 1998–2000 to 4.7% in 2007–2008 among DM patients, and from 4.2% to 3.7% during the same time periods for non-diabetic patients. The rates of one-year post-discharge ischemic stroke among CKD patients decreased between 2003–2004 and 2009–2010 from 4.1% to 2.5%, and from 2.0% to 1.3% among non-CKD patients. Lower stroke risk was associated with percutaneous coronary intervention and initiation of secondary preventive treatments in-hospital. Among DM and CKD patients with above-target baseline values in the NAILED trial, the median LDL-C value at 12 months was 2.2 versus 3.0 mmol/L (p<0.001) and median systolic BP was 140 versus 145 mmHg (p=0.26) for intervention and control patients, respectively. Before the guideline change, 96% of the intervention and 70% of the control patients reached the target LDL-C value (p<0.001). After the guideline change, the corresponding respective proportions were 65% and 36% (p<0.001).

**Conclusion:** Ischemic stroke is a fairly common post-AMI complication among patients with DM and CKD. This risk of stroke has decreased during recent years, possibly due to the increased use of evidence-based therapies. Compared with usual care, cardiovascular secondary prevention including nurse-based telephone follow-up improved LDL-C values at 12 months after discharge in patients with DM or CVD, and led to more efficient implementation of new secondary preventive guidelines.

**Keywords**
cardiovascular disease, secondary prevention, diabetes mellitus, chronic kidney disease, acute coronary syndrome, stroke, randomized control trial