Blood pressure levels and risk of haemorrhagic stroke in patients with atrial fibrillation and anticoagulants: results from a primary care cohort with hypertension

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Background: Haemorrhagic stroke (HS) is a serious condition that kills and debilitates many of those afflicted by it. Hypertension and oral anticoagulation (OAC) are independent risk factors for HS. Many patients with atrial fibrillation (AF) have hypertension and OAC. The concomitance of hypertension and OAC confers an even higher risk of haemorrhagic stroke, but less is known about the association between specific blood pressure levels and the risk of HS in patients with AF and OAC.

Purpose: To assess the risk of haemorrhagic stroke at different systolic blood pressure (SBP) levels in a primary care population with hypertension, AF and OAC.

Methods: We identified 3972 patients with hypertension, AF and OAC in a primary care database in southern Sweden. We followed patients from Jan 1, 2006 until a first event of HS, death, cessation of OAC or Dec 31, 2016. HS was defined as ICD-10 diagnosis codes: I60, I61, and I62. We analysed the association between SBP levels and HS by dividing SBP into five categories: <130, 130–139, 140–159, 160–179 and ≥180 mmHg. We also fitted a spline curve to visualise the relationship between SBP and HS. Hazard ratios (HR) were calculated for the SBP categories with a Cox proportional hazards model. The 130–139 group was used as a reference in the model. We identified age, sex, previous stroke, platelet inhibitor treatment, alcohol abuse and smoking as possible confounders with a directed acyclic graph and included them as co-variates in the model.

Results: We identified 51 cases of HS during follow-up. In the categorical analysis of SBP, point estimates of HRs for HS increased gradually from the lowest SBP category to the 160–179 category. Only the 160–179 category had a significantly different HR (3.76, CI 1.56–9.04) than the reference 130–139 category, however. See Table 1. No other co-variates were significantly associated with HS. The spline curve, Figure 1, illustrates a significantly increased HR for HS in the 140–175 SBP range.

Conclusions: In this real-world primary care cohort with hypertension, AF and OAC, we found that SBP in the 160–179 mmHg range was significantly associated with an increased risk of haemorrhagic stroke. Our findings emphasise the importance of blood pressure control in this patient category.

Table 1. Outcomes

	Systolic blood pressure categories				
	<130 mmHg	130–139 mmHg	140–159 mmHg	160–179 mmHg	≥180 mmHg
Number of patients	1031	829	1440	497	175
Haemorrhagic strokes (%)	8 (0.8%)	8 (0.8%)	17 (1.2%)	18 (3.6%)	1 (0.6%)
Hazard ratio (95% CI)	0.99 (0.36–2.73)	1 (reference)	1.34 (0.56–3.25)	3.76 (1.56–9.04)	0.59 (0.07–4.83)

Figures are numbers (percentage) unless stated otherwise. CI: confidence interval.

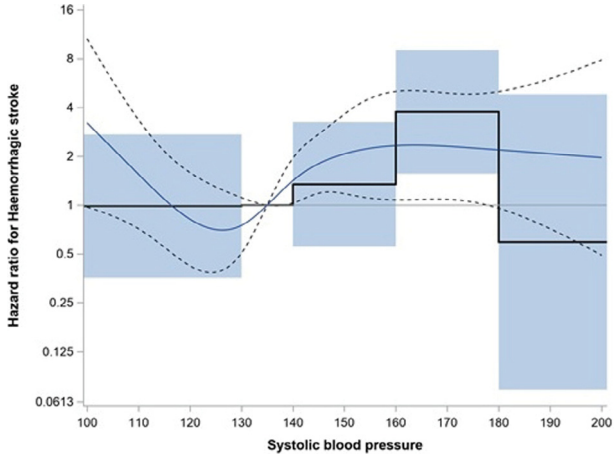

Figure 1. Continuous and categorical SBP & HS risk