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Survival Analysis after a First Ischaemic Stroke Event: A Case-Control Study in the Adult Population of England.

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Abstract : Stroke is associated with a significant risk of morbidity and mortality. There is scarcity of research on the long-term survival after first-ever ischaemic stroke (IS) events in England with regards to effects of different medical therapies and comorbidities. The objective of this study was to model the all-cause mortality after an IS diagnosis in the adult population of England. Using a retrospective case-control design, we extracted the electronic medical records of patients born prior to or in year 1960 in England with a first-ever ischaemic stroke diagnosis from January 1986 to January 2017 within the Health and Improvement Network (THIN) database. Participants with a history of ischaemic stroke were matched to 3 controls by sex and age at diagnosis and general practice. The primary outcome was the all-cause mortality. The hazards of the all-cause mortality were estimated using a Weibull-Cox survival model which included both scale and shape effects and a shared random effect of general practice. The model included sex, birth cohort, socio-economic status, comorbidities and medical therapies. 20,250 patients with a history of IS (cases) and 55,519 controls were followed up to 30 years. From 2008 to 2015, the one-year all-cause mortality for the IS patients declined with an absolute change of -0.5%. Preventive treatments to cases increased considerably over time. These included prescriptions of statins and antihypertensives. However, prescriptions for antiplatelet drugs decreased in the routine general practice since 2010. The survival model revealed a survival benefit of antiplatelet treatment to stroke survivors with hazard ratio (HR) of 0.92 (0.90 – 0.94). IS diagnosis had significant interactions with gender and age at entry and hypertension diagnosis. IS diagnosis was associated with high risk of all-cause mortality with HR= 3.39 (3.05-3.72) for cases compared to controls. Hypertension was associated with poor survival with HR = 4.79 (4.49 - 5.09) for hypertensive cases relative to non-hypertensive controls, though the detrimental effect of hypertension has not reached significance for hypertensive controls, HR = 1.19(0.82-1.56). This study of English primary care data showed that between 2008 and 2015, the rates of prescriptions of stroke preventive treatments increased, and a short-term all-cause mortality after IS stroke declined. However, stroke resulted in poor long-term survival. Hypertension, a modifiable risk factor, was found to be associated with poor survival outcomes in IS patients. Antiplatelet drugs were found to be protective to survival. Better efforts are required to reduce the burden of stroke through health service development and primary prevention.

Keywords : general practice, hazard ratio, health improvement network (THIN), ischaemic stroke, multiple imputation, Weibull-Cox model.
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