Preventing stroke on the street where you live, work, and play

Published Online
March 14, 2018
http://dx.doi.org/10.1016/S2468-2667(18)30046-X

See Articles page e185

Living in a disadvantaged neighbourhood can be bad for your health.[1] For stroke, the evidence is generally consistent in showing increased stroke incidence among those living in more disadvantaged neighbourhoods,[2,3] probably as a result of a worse biological risk factor profile. Less is known about the association of neighbourhood socioeconomic status with stroke care and mortality.

In *The Lancet Public Health*, Benjamin Bray and colleagues use data from the national hospital stroke registry covering all of England, Wales, and Northern Ireland to create an extraordinary cohort study of 145 324 cases of first-ever stroke among adults in England to examine stroke incidence, quality-of-care metrics, and 1-year case fatality according to neighbourhood socioeconomic status.[4] The objective to examine stroke, stroke care, and stroke outcome in this large sample by a well constructed measure of socioeconomic neighborhood deprivation is very innovative. Their measure of neighbourhood socioeconomic status was the Index of Multiple Deprivation, a composite measure covering a wide range of deprivation indicators including income, employment, education and skills, health and disability, crime, barriers to housing and services, and living environment.[5] After adjustment for age and sex, there were large differences between the most and least deprived deciles for both ischaemic stroke (adjusted incidence rate ratio 2·0, 95% CI 1·7–2·3) and intracerebral haemorrhage (1·6, 1·3–1·9). As others have also reported,[6] an inverse association was found between level of deprivation and prevalence of diabetes, but Bray and colleagues extended this finding to show this increased prevalence to be a mediator of elevated risk of ischaemic stroke in people living in more deprived areas.

Results from this study stimulate hypotheses for future investigation. Only a few aspects of quality of stroke care in the hospital were found to differ by deprivation area, such as less use of anticoagulation for atrial fibrillation for people from the most deprived areas. However, differences in quality of care might be related to differential availability of care. For example, is availability of stroke units or of specialist stroke physicians lower in deprived regions? Other quality measures, such as being discharged on secondary prevention medications, are also important. There is evidence that people discharged on these medications are more likely to continue therapy even 10 years after stroke.[7] Bray and colleagues showed that adjusting for comorbidities attenuated the association between deprivation and 1-month case fatality,[4] but control of risk factors after stroke is unknown. If people in more deprived regions have their risk factors less controlled—eg, by fewer prescriptions, reduced compliance, or diminished capacity to pay for medications—this might explain both the increased risk of stroke and the greater case fatality.

The study is not without limitations, and the authors do well to acknowledge them. Although hypertension, diabetes, and atrial fibrillation were defined as pre-existing from the patient's health record, some important pre-stroke risk factors such as smoking were unavailable. The older average age in the least deprived areas could affect the prevalence of comorbidities such as atrial fibrillation because assessment might be more complete at older ages. Atrial fibrillation is more likely to be assessed during hospitalisation but diagnoses made while in hospital for first-ever stroke were not included. Additionally, as the authors acknowledge, occurrences of strokes that did not result in hospitalisation were not considered, so the true incidence of stroke is likely to have been underestimated, which could introduce a differential bias because neighbourhood affluence could affect the likelihood of hospitalisation. Finally, data were not available for analysis by race or ethnicity.[4]

Can these results be applied to other countries or within smaller geographical areas? Neighbourhood socioeconomic status is difficult to define and other investigators have employed different definitions.[2] There is also evidence that individual-level socioeconomic factors are associated with stroke risk independent of neighbourhood-level socioeconomic factors.[3] Socioeconomic status is a complex metric that encompasses the community in which an individual lives, works, and plays. However, simply considered, it is a marker of deprivation, in which an individual or a neighbourhood has less access to resources or fewer resources owing to limited income, wealth, and knowledge (ie, education). Results from

Bray and colleagues' study can indeed help to guide the organisation of social and health-care services where greater societal cost–benefit results can be achieved.

The literature also supports the association of childhood socioeconomic status with adult risk of stroke,[8] potentially through enabling healthy behaviours and preventing or managing risk factors. Bray and colleagues found that patients from the most deprived areas had a first stroke approximately 7 years earlier than those from the least deprived area,[4] suggesting that more and earlier attention should be given to primordial prevention, including promoting a healthy lifestyle. Socioeconomic status itself is difficult to modify. Instead, communities need to be empowered to make decisions about positive lifestyle changes and use of medications. Education provides a mechanism for making these changes. We need to better target prevention and management efforts directed across the gradient of socioeconomic disadvantage, consider the barriers, and start earlier in life.

Virginia J Howard, Amanda G Thrift
Department of Epidemiology, School of Public Health, University of Alabama at Birmingham, Birmingham, Alabama, USA; (VJH) and Stroke and Ageing Research, Department of Medicine, School of Clinical Sciences at Monash Health, Monash University, Clayton, VIC, Australia (AGT)
vjhoward@uab.edu

VJH declares no competing interests. AGT reports grants from the National Health and Medical Research Council, outside of the submitted work.

1 Cubbin C, Sundquist K, Ahlen H, Johansson SE, Winkleby MA, Sundquist J. Neighborhood deprivation and cardiovascular disease risk factors: protective and harmful effects. *Scand J Public Health* 2006; **34:** 228–37.
2 Howard VJ, McClure LA, Kleindorfer DO, et al. Neighborhood socioeconomic index and stroke incidence in a national cohort of blacks and whites. *Neurology* 2016; **87:** 2340–47.
3 Marshall IJ, Wang Y, Crichton S, McKevitt C, Rudd AG, Wolfe CD. The effects of socioeconomic status on stroke risk and outcomes. *Lancet Neurol* 2015; **14:** 1206–18.
4 Bray BD, Paley L, Hoffman A, et al. Socioeconomic disparities in first stroke incidence, quality of care and survival: a nationwide registry-based cohort study of 44 million adults in England. *Lancet Public Health* 2018; published online March 14. http://dx.doi.org/10.1016/S2468-2667(18)30030-6.
5 Kontopantelis E, Mamas MA, van Marwijk H, et al. Geographical epidemiology of health and overall deprivation in England, its changes and persistence from 2004 to 2015: a longitudinal spatial population study. *J Epidemiol Community Health* 2018; **72:** 140–47.
6 Grintsova O, Maier W, Mielck A. Inequalities in health care among patients with type 2 diabetes by individual socio-economic status (SES) and regional deprivation: a systematic literature review. *Int J Equity Health* 2014; **13:** 43.
7 Thrift AG, Kim J, Douzmanian V, et al. Discharge is a critical time to influence 10-year use of secondary prevention therapies for stroke. *Stroke* 2014; **45:** 539–44.
8 McHutchison CA, Backhouse EV, Cvoro V, Shenkin SD, Wardlaw JM. Education, socioeconomic status, and intelligence in childhood and stroke risk in later life: a meta-analysis. *Epidemiology* 2017; **28:** 608–18.