Insight

Global prevention of stroke and dementia: the WSO Declaration

The global burden of stroke and dementia are increasing. If current trends continue, by 2050 we can expect about 200 million stroke survivors and 106 million people with dementia, and each year thereafter, over 30 million new strokes, 12 million deaths from stroke, and almost 5 million deaths from dementia. This looming future will threaten the sustainability of health systems worldwide. Yet it is preventable, as a substantial proportion of the burden is attributable to risk factors that can be modified. However, current strategies of primary prevention for stroke and cardiovascular disease to modify causal risk factors have not proved sufficiently effective in containing the rapidly increasing burden of stroke. There is an urgent need to address the limitations of current strategies, and to entertain new, more effective, affordable, and widely applicable strategies to complement current approaches in the fight against stroke and dementia. Given the commonality of risk factors and the reciprocal relationship of stroke and dementia, a joint prevention strategy is recommended.

The primary prevention of stroke and dementia is a priority of the World Stroke Organization (WSO). In 2020, the WSO Board of Directors adopted the Declaration for worldwide stroke and dementia prevention (figure), and the concept of prevention entitled the Cut Stroke in Half framework. The WSO recommends that primary stroke and dementia prevention interventions meet the following criteria: (1) sufficient evidence of efficacy, (2) potential population-wide coverage, (3) applicability for both stroke and dementia prevention, and (4) low cost and affordability even in low-income countries. Of the available strategies analysed, only four met all these four criteria. First, a population-wide strategy to reduce exposure to risk factors associated with stroke, dementia, cardiovascular disease, and other risk factors related to non-communicable diseases (including environmental risk factors such as air pollution), across the lifespan, regardless of the degree of cardiovascular disease risk. Second, a motivational population-wide strategy using the free Stroke Riskometer app to reduce lifestyle and other risk factors in adults at any increased risk of stroke development. Third, a polypill strategy (consisting of two generic low-dose blood pressure drugs [eg, losartan 16 mg and amlodipine 2·5 mg] and one generic lipid lowering medication [eg, rosuvastatin calcium 10 mg]) for middle-age and older adults at risk of cardiovascular disease (ie, those with at least two behavioural or metabolic cardiovascular disease risk factors). Fourth, preventative strategies to control behavioural risk factors (especially smoking and high blood pressure) and diabetes via community health workers (community health workers were also suggested to facilitate implementation of strategies 2 and 3).

The WSO also recommends abandoning categorisation of people into low, moderate, and high risk for stroke or cardiovascular disease, but rather considering stroke risk as a continuum. Policy makers should prioritise population-wide strategies for the primary prevention of stroke and dementia, cardiovascular disease, and other major non-communicable diseases. These measures should be facilitated by imposing taxation on smoking, sugar, and alcohol to reduce their consumption and promote healthy behaviours, as well as addressing air pollution and societal issues during the life course (eg, socioeconomic disparities, so-called junk-food outlets, inequalities of access to health facilities) known to underpin stroke, dementia, and other non-communicable diseases. Revenues from such taxations can and should be reinvested back into the public health sector to further improve prevention, research, and health care.

Current primary stroke and cardiovascular disease prevention strategies emphasise the so-called high-risk approach to prevention, which targets exclusively individuals at high risk of disease. Although this approach can be effective for some individuals, it might not include risk assessments and interventions for some important lifestyle factors (eg, poor diet, physical activity, obesity, alcohol intake) and might be too expensive to implement in resource-poor countries. Moreover, it excludes people with low-to-moderate cardiovascular disease risk who will ultimately comprise about 80% of future strokes and cardiovascular events, and thereby might have been falsely reassured that they are protected from developing these diseases. Hence, evidence is lacking for the effectiveness of the high-risk approach in preventing stroke and acute cardiovascular events at the population level (appendix p1).

For more on **potentially modifiable risk factors for stroke** see *Stroke* 2020; **51:** 719–28

For more on **preventing dementia by preventing stroke** see *Alz Dem* 2019; **15:** 961–84

For more on **Cut Stroke in Half** see *Int J Stroke* 2018; **13:** 633–47

For more on the **Stroke Riskometer app** see http://www.strokeriskometer.com/

For more on **combined high-risk and population-wide prevention strategies** see *J Am Heart Assoc* 2020; **9:** e014494

For more on the **high-risk approach for prevention** see *Cochrane Dat Syst Rev* 2019; **1:** CD009009

See **Online** for appendix

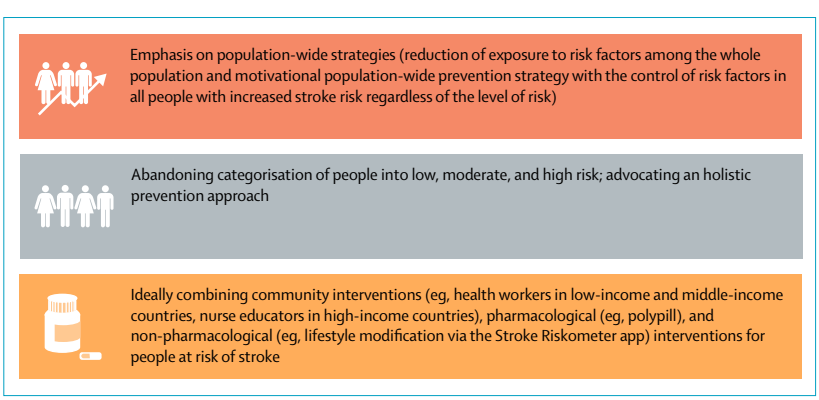

Figure: **Key principles of the WSO Declaration on the primary prevention of stroke and dementia globally**

For more on **primary prevention of stroke by healthy lifestyle** see *Circulation* 2008; **118:** 947–54

For more on **digital health intervention at older ages** see **Comment** *Lancet Dig Health* 2019; **1:** e382–83

For more on **population-wide motivational strategies** see *BMJ Global Health* 2017; **2:** e000306

For more on the **pilot randomised controlled trial of the Stroke Riskometer app** see *Stroke* 2018; **50:** 196–8

For more on **multidomain interventions in at-risk elderly** people see **Articles** *Lancet* 2015; **385:** 2255–63

For more on **blood pressure and cholesterol lowering in persons without cardiovascular disease** see *New Engl J Med* 2016; **374:** 2032–43

For more on **antihypertensive medications and risk for incident dementia and Alzheimer's disease** see **Articles** *Lancet Neurol* 2020; **19:** 61–70

For more on **efficacy and tolerability of polypills** see *PLoS One* 2012; **7:** e52145

For more on the **polypill trials** see *New Engl J Med* 2019; **381:** 1114–23 and **Articles** *Lancet* 2019; **394:** 672–83

For more on **the role of community health workers for non-communicable diseases prevention and control in developing countries** see *PLoS One* 2017; **12:** e0180640

For more on the **HOPE-3 trial** see *New Engl J Med* 2016; **374:** 2032–43

For more on **stroke prevention** see *Neurology* 2019; **93:** e2121-32

For more on **multi-level community interventions for primary stroke prevention** see *International Journal of Stroke* 2019; **14:** 818–25

The WSO advocates for the high-risk approach to be complemented by the population-wide approach to prevention, with the emphasis on the mass approach aimed to lower the level of exposure of the entire population to environmental and lifestyle risk factors for stroke and dementia across the life course and across the continuum of stroke, cardiovascular disease, and dementia risk. There is evidence from a large cohort study that controlling just five lifestyle risk factors (smoking, physical activity, diet, alcohol consumption, weight) could reduce the risk of stroke by 47% (95% CI 18–69) in women and by 35% (95% CI 7–58) in men. The worldwide use of mobile technologies, with very high penetration even in low-income countries, offers a new far-reaching interface for lifestyle modification comparable (by the coverage of the population and potential efficacy) with population-wide strategies.

Internet-based interventions to modify cardiovascular disease risk through individual-level interventions (eg, the HATICE trial) have shown a significant improvement in a combined end point of systolic blood pressure, LDL cholesterol, and body-mass index (mean difference –0·05, 95% CI –0·08 to –0·01, p=0·008), but no evidence of effect on individual measures of risk. A pilot randomised controlled trial (RCT) of the use of the Stroke Riskometer app showed significant motivational value for the use of relative risk estimates for communicating stroke risk to users, high acceptability (80%), and potential efficacy of the lifestyle modification, although the lifestyle modification effect was not statistically significant. The Stroke Riskometer app is free, validated, and internationally endorsed by the WSO, World Federation of Neurology, World Heart Federation, and European Stroke Organisation.

There is also evidence from large RCTs that a healthy diet and exercise coupled with cognitive training can improve or maintain cognitive function in elderly people in the general population, and that blood pressure reduction reduces the risk of incident dementia (hazard ratio [HR] 0·88, 95% CI 0·79–0·98, p=0·019) and Alzheimer's disease (HR 0·84, 95% CI 0·73–0·97, p=0·021). The use of a combination of blood pressure and lipid lowering medications is proven to be generally safe, even in people with average or below-average systolic blood pressure (SBP) and cholesterol levels and, in low dosages such as in the polypill, as an adjunct therapy to other blood pressure and lipid lowering medications. A meta-analysis of RCTs that compared a polypill (including at least one anti-hypertensive and one lipid-lowering medication) with a placebo (or one active component) showed clinically significant reductions in SBP of 9·2 mm Hg (95% CI 5·0–13·4) and LDL cholesterol of 39·1 mg/dL (95% CI 25·9–5·0). Two large polypill primary prevention RCTs (appendix p1) showed a significant positive effect on either SBP (9 mm Hg reduction in the polypill group *vs* 2 mm Hg reduction in the usual care group) and cholesterol (15 mg/dL reduction in the polypill group *vs* 4 mg/dL reduction in the usual care group) or a 2·9% absolute risk reduction in cardiovascular disease events (PolyIran trial). In the HOPE-3 trial, a combination of rosuvastatin (10 mg per day), candesartan (16 mg per day), and hydrochlorothiazide (12·5 mg per day) versus usual care reduced cardiovascular disease events by 29% over about 5·6 years in adults at moderate risk of cardiovascular disease.

A meta-analysis of 16 RCTs of non-communicable disease prevention using informational and behavioural approaches showed that, compared with standard care, using community health workers in health programmes has the potential to be more effective in low-to-medium income countries. There is preliminary evidence that the combination of personal (blood pressure and lipid lowering drugs) and non-personal (eg, health education, salt reduction in processed food, lifestyle modifications) interventions are cost-effective and could lower the global incidence of cardiovascular disease and stroke events by as much as 50%.

WSO advocates that strategies for primary prevention of stroke and dementia should be integrated within the WHO HEARTS initiative. Reducing exposure to risk factors on the population level regardless of cardiovascular disease risk (eg, smoking cessation campaigns, reducing salt and sugar in processed food, and restricting alcohol consumption) would apply to the general population, while motivational education about behavioural risks (poor diet, physical inactivity, alcohol use, and smoking) via the free Stroke Riskometer app would apply to the general population at any risk of cardiovascular disease. Simple inexpensive screening by community health workers or people from stroke support organisations to identify people with elevated blood pressure in resource-poor settings or high cardiovascular disease risk screening (including blood lipid tests) by medical professionals in more affluent countries would identify individuals in need of prophylactic drug therapy, and should be delivered in conjunction with lifestyle and behavioural interventions. The WSO estimated that the recommended multisectoral (including government, non-governmental organisations, health-care policy makers, and health-care providers) population approach would reduce stroke incidence by 50% and dementia incidence by at least 30%, while also decreasing incidence from other non-communicable disorders that share common risk factors with stroke, thus saving millions of lives worldwide. Additionally, this approach would save hundreds of billions of dollars annually that should be reinvested to improve health services, preventative programmes, and health-related research.

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