

# China Stroke Statistics 2019: a wealth of opportunities for stroke prevention

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The China Stroke Statistics published in this issue of the journal<sup>1</sup> represent an enormous undertaking. It included data on 3010204 patients who had a stroke admitted in 2018 to 1853 tertiary care hospitals and compiled data from multiple sources on stroke and stroke risk factors in China. The authors and the huge team of workers who must have compiled the statistics are to be commended on this enormous effort. In the report is a wealth of data on what is wrong in China to cause such a high risk of stroke but also a wealth of opportunity to make a difference. The reason this is so important is that ~80% of strokes are preventable.

## STROKE INCIDENCE HIGHEST IN CHINA

According to the 2016 Global Burden of Disease Study, China had the highest estimated lifetime risk of stroke from age 25 years onwards of up to 39.3%, compared with 22.2% in Western Europe and 22.4% in high-income North America.<sup>2</sup>

It is evident from the ratio of strokes to myocardial infarctions in China that hypertension is a major driver of stroke risk. In North America, myocardial infarctions (MI) outnumber strokes, but in China, stroke was historically much more common, though myocardial infarctions have been increasing in recent years. In 2003, in urban China, deaths from stroke were 8.5 times as common as deaths from MI; by 2013, strokes had increased by 26.6%, whereas death from MI increased by 213%, and deaths from stroke were only 2.5 times that of death from MI. This change is no doubt due to increased intake of meat and egg yolk with increasing prosperity in China.<sup>3</sup>

## OPPORTUNITIES FOR STROKE PREVENTION ARISING FROM THE DATA

### Smoking cessation

In 2018, the prevalence of tobacco smoking in China was 50.5% of men and 2.1% of women above age 15 years. Among stroke survivors in China, it was 72.28% in men and 17.54%

in women.<sup>1</sup> On a patient basis, there are ways for physicians to help patients quit smoking. A systematic approach such as the Ottawa protocol<sup>4</sup> is more effective than haphazard approaches; it includes counselling, liberal use of nicotine substitutes and sometimes medication such as varenicline or bupropion. In the Insulin Resistance Intervention After Stroke trial, smoking cessation after stroke was associated with a 34% reduction of the 5-year risk of stroke and MI or vascular death.<sup>5</sup> On a population basis, however, interventions by government would be more likely to make a big difference. Banning smoking in public places, preventing sales of tobacco to minors, increasing taxation on tobacco products and printing smoke prevention messages on tobacco packaging are examples of such interventions that can make a difference.

### Reduction of sodium intake

The report says 'The average daily salt intake among Chinese adults ≥18 years of age was 10.5 g from 2010–2012, which is lower than 13.9 g in 1992 and 12.0 g in 2002. The recommended amount of daily salt intake as per the Chinese Dietary Guidelines is 6 g. As such, the average intake among Chinese adults in 2012 was still 75.0% higher than the recommended value from 2010 to 2012'. However, in a country where hypertension is a major cause of stroke, it is a mistake to aim for a daily intake of 6 g per day of salt. Lower salt intakes reduce blood pressure, particularly in patients with higher blood pressure. A more effective target salt intake would be ~3 g per day. This would require a major societal change. Substituting potassium for part of the sodium in table salt, reducing the salt content of soya sauce, using more vinegar, spices and hot peppers would be approaches that could help. Salt intake is a vicious circle: a high salt intake downregulates salt taste buds on the tongue, so a salty taste is not appreciated, resulting in addition of more salt. It can help to educate patients that within ~3 weeks of reducing their salt intake, the salt taste buds upregulate (receptor



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upregulation), so they will begin to taste the salt in foods containing less salt.

### Increasing intake of whole grains

A recent study of national dietary guidelines concluded that the dietary change that would have the biggest effect on reduction of non-communicable diseases, with the greatest reduction of greenhouse gases, would be to increase intake of whole grains.<sup>6</sup> In China, the biggest effect would probably result from switching from polished rice to brown rice. Again, this would represent a major cultural change.

### Better treatment of hypertension

Among stroke survivors, 83.71% of men and 84.89% of women had hypertension.<sup>1</sup>

There have been major problems with treatment of hypertension in China. Lu *et al*<sup>7</sup> reported that only 36% of hypertensives are aware of it, only 22.9% are on treatment and only 5.7% are controlled. Above age 65 years, ~60% of the population are hypertensive, and the control rates are very low.<sup>7</sup>

Much improvement is attainable at low cost by increasing the use of diuretics, particularly given the very high salt intake in China. Su *et al*<sup>8</sup> reported from a nationwide survey that only 4.5% of hypertensive patients were prescribed diuretics. In part this may be due to lack of appropriate medications in pharmacies. Only 32.7% of pharmacies in China stocked high-value medications for hypertension, and only 11.2% of all prescriptions for hypertension were high-value medications.<sup>8</sup>

In a recent randomised trial aiming to control blood pressure to target systolic blood pressure <150, <140 and <130 mm Hg,<sup>9</sup> the protocol specified that initial therapy for all participants was a tablet of therapy was a daily oral dose of one tablet of enalapril 10 mg and folic acid 0.8 mg. 'Other drugs, including calcium-channel blockers. (CCBs) (amlodipine preferred), diuretics (hydrochlorothiazide preferred), and  $\beta$ -blockers, were allowed, in order to achieve the SBP target'. In that study, the percentage of patients who received diuretic was ~20% in the <150 mm Hg group, 30% in the <140 mm Hg group and 40% in the <130 mm Hg group. This illustrates the opportunity for improved blood pressure control by increasing use of diuretics.

In 2017, I reviewed opportunities for improving blood pressure control in China.<sup>10</sup> 'Causes of resistant hypertension include 1) non-compliance; (2) consumption of substances that aggravated hypertension, such as excess salt, alcohol, licorice, decongestants and oral contraceptives; (3) therapeutic inertia (failure to intensify therapy when target blood pressures are not achieved); and (4) diagnostic inertia (failure to investigate the cause of resistant hypertension)'.<sup>10</sup>

A major opportunity to improve blood pressure control in patients with resistant hypertension is 'diagnostic inertia'. Physiologically individualised therapy based on phenotyping with plasma aldosterone and renin markedly improves blood pressure control.<sup>11</sup> A Chinese study<sup>12</sup>

reported that interpretation of the aldosterone/renin phenotype must take into account the class of hypertensive drug being used at the time of blood sampling. It is most informative to measure plasma aldosterone and renin in a stimulated condition (when the patient is taking diuretic, ACE inhibitor or angiotensin receptor blocker).

In conclusion, there is much that can be done to reduce the enormous burden of stroke in China. Reducing smoking and salt intake, and improving blood pressure control, could probably reduce stroke by half.<sup>13</sup> The cost of stroke is so high in China that determined efforts to do so should be undertaken.

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