

Initial establishment of a stroke management model in China: 10 years (2011–2020) of Stroke Prevention Project Committee, National Health Commission

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Stroke has the characteristics of high rates of recurrence, disability, and mortality, and it has a heavy economic burden in China and around the world.^[1,2] The “Report on Nutrition and Chronic Disease Status of Chinese Residents (2020)” shows that deaths from chronic diseases accounted for 88.5% of the total deaths, and strokes, in particular, have been the first cause of death in China.^[3] The China lifetime risk of stroke from 25 years onward was 39.3%, whereas the global estimated risk was approximately 25%.^[4]

In the recent years, the age of stroke onset has become younger (the average age of stroke patients is <60 years), and stroke has become a severe medical and social problem. The National Epidemiological Survey of Stroke in China (NESS-China) indicated the annual estimates of 11 million prevalent cases of stroke, 2.4 million new strokes, and 1.1 million stroke-related deaths in China in 2013.^[5] To meet the stroke challenge, the Ministry of Health China Stroke Prevention Project Committee (CSPPC) was established in April 2011.^[6] Since the establishment of the CSPPC, under the leadership of the National Health Commission, it has organized national health departments, medical institutions, and Centers for Disease Control and Prevention (CDC) to carry out stroke prevention and treatment work. Through 10 years of continuous and in-depth work, remarkable results have been achieved.

An effective stroke prevention and treatment strategy has been developed. In 2010, the CSPPC put forward the 32-word prevention and control strategy. The core is

prevention first, the barrier moves forward. In addition, adopt hierarchical management for the population, carry out comprehensive interventions for high-risk groups of strokes, and adopt a hierarchical diagnosis and treatment model for patients. These strategies lead an ox by its halter in the prevention and treatment of chronic diseases.

The government has incorporated stroke prevention and treatment into the “Healthy China 2030” program, elevating stroke work to a national strategy. The “Technical Program for Screening and Comprehensive Intervention for High-Risk Stroke Populations” issued by the CSPPC has been implemented in 245 cities in 31 provinces across the country, covering >2% of the target population. The CSPPC established a stroke prevention and treatment network with 562 tertiary hospitals as the core, 990 district and county-level secondary hospitals, and >1000 community and township primary medical institutions as cooperative units.

The stroke prevention and treatment system has been innovated. The CSPPC creatively proposes and establishes a stroke prevention and treatment system led by the governments, with the participation of medical institutions, CDC, and primary community and implements a stratified stroke management model. Relying on 325 stroke prevention and treatment base hospitals, implement pre-hospital “Stroke High-Risk Population Screening and Acute Stroke Patients First Aid,” in-hospital “High-Risk Screening and Multidisciplinary Joint Diagnosis and Treatment”, and post-hospital “Follow-up Intervention”, which could cover the whole life cycle. Under the

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organization of health departments at all levels and relying on >300 stroke prevention and treatment base hospitals, the pre-hospital “stroke high-risk population screening and stroke patients with acute attack combined emergency treatment” are widely implemented in various medical institutions. “High-risk screening and multidisciplinary joint diagnosis and treatment” and post-hospital “follow-up intervention” cover the whole life cycle stratified management model. This model can effectively solve the problem that CDC cannot be fully integrated into the prevention and treatment of chronic non-communicable diseases. The estimated number of stroke patients in China in 2020 is 17.88 million, compared with the 21.36 million forecasts released by the World Bank in 2011, decreasing 3.48 million.

An institutionalized multidisciplinary collaborative work model for stroke treatment has been established. The CSPCC led the establishment and certification of the Chinese Stroke Center. As of December 31, 2020, 380 stroke centers in China had been certificated. The construction of the stroke center emphasizes organization and management, requires hospital leaders to serve as the Director of the stroke center, actively integrate resources to promote close multidisciplinary collaboration, implement a “patient-centered” diagnosis and treatment model, and reduce the cost of interdisciplinary collaboration. The suitable critical technologies for stroke prevention and treatment have exploded in the past 10 years. In 2020, compared with 2010, the number of intravenous thrombolysis has increased by 36.8 times, carotid endarterectomy (CEA) had risen by 31.7 times, and carotid artery stenting (CAS) had risen by 32.1 times. The number of hospitals that could carry out CEA had increased by 9.7 times. Interventional thrombus removal had increased by 19.61 times compared with 2015. In 2020, the median door-to-needle time (DNT) of advanced stroke centers had been reduced to 41.0 minutes, reaching the level of developed countries. The efficiency of treatment of patients from stroke centers has been significantly upgraded and the prognosis of stroke patients is significantly improved.^[7-9] The thrombolysis rate of patients from the stroke center is twice than that of other patients. Compared with the non-stroke center patients, stroke center patients’ hospitalization complications are reduced by 50%, and the 3-month disability rate is reduced by 30%.

A stroke first aid map system has been established. In 2017, the “China Stroke First Aid Map” and “Stroke Recognition Action in Thousands of Counties and Ten Thousands of Towns” were launched. The stroke map (an app that allows patients to locate the nearest suitable stroke therapy hospital) and stroke Green Channel create a three 1-hour gold rescue circle, abbreviated as “1-1-1” (onset to call time <1 hour, pre-hospital transfer time <1 hour, and DNT <1 hour). As of December 31, 2020, more than 170 cities, 2000 medical institutions, and emergency centers in 26 provinces across the country have become “Stroke First Aid Map” units.

The nation’s largest cerebrovascular disease big data platform was built. The CSPPC establishes a unified standard big data platform (Bigdata Observatory platform

for Stroke of China [BOSC], <https://www.chinasdc.cn/>) with the support of the National Population and Health Science Data Sharing Platform and other units to provide for the population’s stroke risk factor screening intervention management, stroke center declaration, certification and direct data reporting, stroke first aid map management, and information support. So far, the platform has collected >12.231 million stroke risk factor screening intervention information for people over 40 years old, including 2.235 million high-risk groups and 3935 million follow-up intervention information. In addition, >1500 stroke centers have reported nearly 1 million pieces of clinical diagnosis and treatment information, including thrombolysis, thrombectomy, aneurysm surgery, CEA, CAS, and cerebral hemorrhage surgery.

A lot of medical expenses have been saved. In the past 10 years, a total of 12.231 million people over the age of 40 participated in China Stroke High-Risk Population Screening and intervention program. According to the Chinese Stroke Incidence Prediction Model, it is estimated that 59,000 new strokes have to be reduced, and the direct medical expenses would be reduced by 4.72 billion Chinese Yuan (CNY) (each new stroke is calculated based on the direct medical expenditure of 80,000 CNY). The central government invested 1.38 billion CNY in this special fiscal project, indicating that the work of the CSPPC has an excellent economic effect.

In the past 10 years, the CSPPC has achieved outstanding achievements. However, the stroke burden is expected to increase further as a result of the population aging (in the past 10 years, China’s population over the age of 40 has increased by 100 million), an ongoing high prevalence of non-communicable chronic diseases (eg, hypertension and diabetes), and inadequate management.^[10] In the next 10 years, the CSPPC will work in the following areas to further improve the level of stroke prevention and treatment in China.

Improve the regional stroke prevention and treatment system, and implement the stroke graded diagnosis and treatment system: the first is to continue to carry out the base construction of the “Stroke Recognition Action in Thousands of Counties and Ten Thousand of Towns” and the action of “Hundred Cities and Hundred Maps.” The purpose of the action is to break the barriers of stroke referral and achieve the rapid transfer of patients between hospitals of different levels. The second is to integrate superior resources under the organization of health administrative departments and establish a cerebrovascular disease specialist alliance system led by advanced stroke centers and base hospitals, and other stroke centers and primary medical and health institutions in this region as essential outlets. The third is to guide the sinking of high-quality medical resources, implement hierarchical diagnosis and treatment, and improve the diagnosis and treatment of regional cerebrovascular diseases.

Promote the construction of a national stroke center and improve the prevention and treatment level of a stroke at the county level: Accelerate the construction of stroke centers in general hospitals in cities and counties, and

provide precise assistance from multiple dimensions, such as management, technology, and quality control in the western regions where the construction of stroke centers is relatively lagging. By 2022, in all prefectures and counties with a population of >300,000, at least one secondary general hospital will routinely carry out thrombolytic technology.

Analyze the social and economic value of the implementation of the “China Stroke High-Risk Population Screening and Intervention Program,” and provide a scientific basis for the prevention and control of cardiovascular and cerebrovascular diseases in the “Healthy China 2030” initiative, according to the large-scale population cohort established by the CSPPC.

Strengthen the construction of the talent team and improve the overall level of stroke prevention and treatment: The first is to strengthen the training of stroke treatment technology. The second is to strengthen the training of stroke first aid personnel. The third is to carry out designated assistance activities in the central and western ethnic regions and grassroots.

Promote the integration of Chinese and Western medicine and improve the health literacy of the whole people: To enhance the unique role of Chinese medicine in disease prevention, it is necessary to continue to increase publicity on the prevention and treatment of high-risk factors, such as high blood pressure and diabetes and “Stroke Recognition Action,” enhance the general awareness of the whole society on the stroke screening program and the “The Project to Reduce Millions of New Disabilities,” increase the general public’s understanding of the prevention and treatment of chronic diseases, such as stroke, and improve the compliance of disease prevention and the effectiveness of treatment in the acute phase.

After 10 years of hard work, China’s stroke prevention, control, and treatment capabilities have been significantly improved, and the prognosis of stroke patients has improved significantly. China has a large population, increasing aging, poor control of chronic diseases (such as hypertension and diabetes), and considerable differences in economic and medical levels between regions. These weak factors have brought huge challenges to the prevention and control of chronic non-communicable diseases in China. In the next 10 years, the CSPPC should take policy guidance as the leading factor, consider technical and personnel training, focus on improving residents’ medical and health literacy, and make greater contributions to China’s long-term goal of achieving a “comprehensively well-off society.”

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Conflicts of interest

None.

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