

From acute rescue to lifelong brain health: China's transformation in stroke care and science

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A SYSTEM-LEVEL CHALLENGE

Few fields better illustrate the transformation of neurology in China than stroke. Over the past decade, stroke has moved from being managed mainly as an acute neurological emergency to becoming a test case for building a population-scale, multidisciplinary, learning health system. The need for this transformation is obvious. In 2023, China had an estimated 4.23 million incident strokes, 26.68 million prevalent cases, and 2.05 million stroke-related deaths; stroke also accounted for the largest number of disability-adjusted life-years among hundreds of diseases and injuries in the country.^{1,2} Yet the epidemiological signal is mixed rather than uniformly improving. Age-standardized incidence and mortality have fallen, whereas population aging and improved survival have sustained a large pool of survivors, and the age-standardized prevalence of ischemic stroke has continued to rise.^{1,2} China therefore faces two tasks at once: preventing more first and recurrent events, while building a system capable of supporting millions of people after stroke.

STROKE CENTERS AS THE BACKBONE

Stroke centers became the physical backbone of this transformation. By December 2025, China had 1698 accredited secondary stroke centers and 769 tertiary stroke centers, covering all mainland provinces and about half of all counties.¹ Regional stroke maps linked emergency medical services, hospitals, and referral pathways, while quality indicators increasingly focused attention on treatment delay and evidence-based care. The national median door-to-needle time for intravenous thrombolysis has fallen to about 40 min, and nationwide thrombolysis rates have risen from roughly 10% to 30% of eligible patients over the past decade.¹ The Hospital Quality Monitoring System recorded 8.56 million stroke admissions across 7536 hospitals in 2023, demonstrating the extraordinary scale on which standardization must operate.² These are not merely service statistics. They show how stroke has evolved into a discipline of systems engineering: identifying where time is lost, defining responsibilities across institutions, measuring performance, and redesigning care pathways so that evidence can be delivered reliably.

POLICY TOWARD LIFECYCLE MANAGEMENT

This clinical reorganization was reinforced by a parallel change in policy architecture. Healthy China 2030 placed cardiovascular and cerebrovascular prevention within a national health strategy; the Million Disability Reduction Project launched in 2021 brought 10 government departments into stroke prevention and disability reduction; and the 2023 cardiovascular and cerebrovascular action plan further broadened cross-sector participation. The significance is more than administrative. National stroke policy increasingly describes three linked transitions: from treating disease to protecting health, from passive rescue to active risk management, and from fragmented episodes of care to lifecycle management. In practical terms, the center of gravity is expected to move downward as well as outward—from major tertiary hospitals toward county networks, primary care, families, and digital follow-up. That is a demanding change for a discipline historically defined by specialist expertise, but it is essential if technological advances are to affect population outcomes rather than remain concentrated in high-volume urban centers. Taken together, these developments trace a decade-long progression from capacity building to network development and, more recently, to lifecycle integration (Figure 1).

FROM EVIDENCE ADOPTION TO EVIDENCE GENERATION

At the same time, Chinese stroke research has shifted from adopting international evidence to generating practice-changing evidence. This is most visible in reperfusion and secondary prevention. ANGEL-ASPECT showed that

endovascular thrombectomy can benefit selected patients with large ischemic cores, helping to move thrombectomy beyond the earlier concept of treating only patients with relatively small established infarcts.³ INSPIRES extended the evidence base for early dual antiplatelet therapy in patients with mild ischemic stroke or high-risk transient ischemic attack of presumed atherosclerotic origin, showing benefit when treatment was initiated within 72 h.⁴ For intracerebral hemorrhage, INTERACT3 demonstrated that a protocolized care bundle combining early intensive blood-pressure lowering with management of hyperglycemia, pyrexia, and abnormal anticoagulation improves functional outcomes.⁵ Together with Chinese trials of tenecteplase, basilar artery thrombectomy, genotype-guided antiplatelet therapy, and other strategies, these studies have changed the international perception of China from a large recruitment setting to a major source of clinical evidence.¹ The next scientific step should be equally ambitious: trials should ask not only whether an intervention works under specialized conditions, but how it can be implemented across different levels of the Chinese health system without widening regional inequalities.

PREVENTION BEYOND SCREENING VOLUME

Prevention has undergone a similar conceptual transition. The national high-risk population screening and intervention program, launched in 2011 and progressively expanded across all provinces, has accumulated more than 18 million screening and registration encounters and identified and intervened in more than 5.1 million people at high risk by 2025. National policy has increasingly linked stroke prevention with management of hypertension, diabetes, dyslipidemia, smoking, diet, physical inactivity, and atrial fibrillation, and with primary-care and family-doctor services. This shift matters because China's stroke phenotype is not identical to that of many Western populations. Intracranial atherosclerosis remains particularly important, hemorrhagic stroke contributes disproportionately to disability and mortality, and stroke occurs at a comparatively young average age of about 65 years.¹ These features argue for locally generated risk models and prevention strategies. However, screening volume is not the same as prevention success. The next generation of programs should be judged by sustained blood-pressure and lipid control, medication adherence, first-ever stroke, recurrent stroke, and disability avoided, rather than mainly by the number of people screened.

MAKING RECOVERY A CORE OUTCOME

Rehabilitation and long-term management reveal both the progress and the unfinished work of the discipline. More than 70% of hospitalized patients now receive a rehabilitation assessment in recent national registry data, and policy since 2021 has promoted rehabilitation hospitals, rehabilitation departments in general hospitals, community services, tele-rehabilitation, and home-based care.¹ Brain-heart health managers and digital follow-up programs have also attempted to connect hospital discharge with risk-factor management, medication adherence, functional recovery, and patient education. Yet acute treatment still has stronger metrics, clearer pathways, and more visible investment than post-acute recovery. A system that can recanalize an artery within minutes but loses the patient after discharge remains only partially successful. Functional independence, cognition, depression, return to work, caregiver burden, social participation, and patient-reported outcomes should become routine quality indicators, not secondary research endpoints.

EQUITY AS THE NEXT FRONTIER

The remaining challenge is equity. The same national data that demonstrate progress also show concentration of care in tertiary hospitals and

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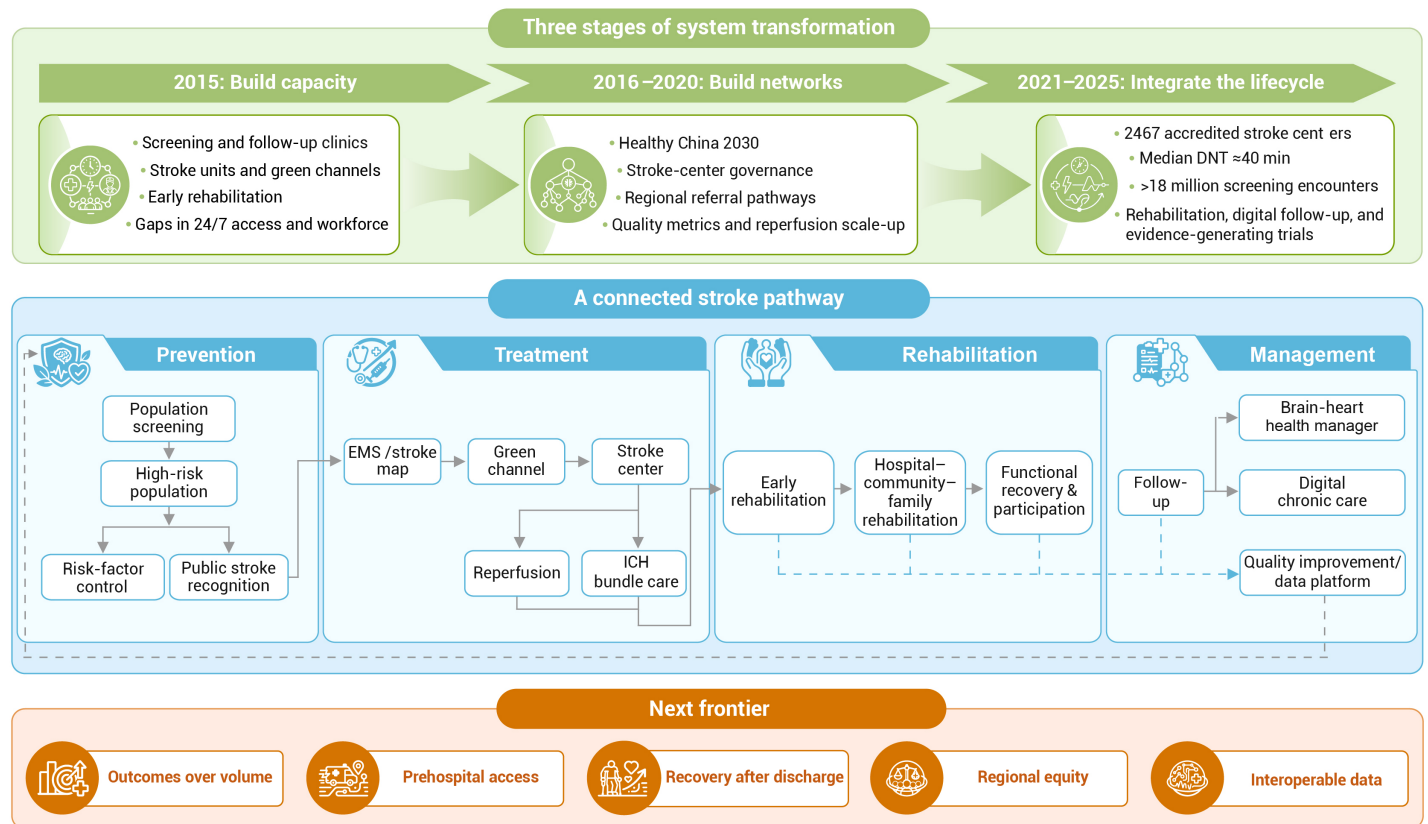


Figure 1. China's evolving stroke discipline: from capacity building to a learning health system The upper timeline shows the shift from capacity building in 2015, through network development in 2016–2020, to lifecycle integration in 2021–2025. The connected pathway links prevention, treatment, rehabilitation, and long-term management, while the "Next frontier" row highlights outcomes over volume, prehospital access, recovery after discharge, regional equity, and interoperable data. Selected program indicators come from national reports and platforms; changing definitions and denominators mean they should be interpreted as system-level snapshots rather than a single longitudinal cohort.

persistent urban-rural and regional differences in stroke burden, workforce, and access.^{1,2} The next decade should therefore be less about counting centers and more about measuring what those centers change. Four questions should guide the field: Are fewer people having a first or recurrent stroke? Are patients reaching effective treatment earlier regardless of geography? Are more survivors regaining independence and social participation? And are data being used to close, rather than simply describe, disparities? Answering these questions will require interoperable data, stable primary-care and rehabilitation financing, stronger emergency transport, regionally adapted implementation strategies, and transparent outcome reporting.

FROM INFRASTRUCTURE TO POPULATION BENEFIT

China's experience over the past decade offers a broader lesson for neurology. Scientific progress is usually described through new targets, drugs, devices, or procedures, but the impact of innovation depends on whether a health system can deliver it to the right person at the right time and sustain benefit after the acute episode. Stroke in China has begun to connect discovery, trials, acute care, prevention, rehabilitation, digital health, and policy into one discipline. The next phase should convert this impressive infrastructure into measurable population benefit. If China can do so while narrowing geographic and socioeconomic gaps, its contribution to global stroke care will extend beyond individual landmark trials: it will provide a model for how neurological innovation can be organized at national scale.

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AUTHOR CONTRIBUTIONS

All authors contributed to the manuscript and approved the final version.

DECLARATION OF INTERESTS

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