Online Supplemental Material

China Stroke Statistics: An Update on the 2019 Report From the National Center for Healthcare Quality Management in Neurological Diseases, China National Clinical Research Center for Neurological Diseases, the Chinese Stroke Association, National Center for Chronic and Non-communicable Disease Control and Prevention, Chinese Center for Disease Control and Prevention and Institute for Global Neuroscience and Stroke Collaborations

1. Supplementary Methods

1.1 Data sources

In this Statistical Update, the results of Global Burden of Disease (GBD) 2019 is used for the prevalence and incidence of stroke [1].

Mortality data from 2003 to 2019 were provided by the National Mortality Surveillance System (NMSS). NMSS provides the total and cause-specific mortality by provinces and facilitates the development of a comprehensive real-time registration and mortality surveillance system. This system covered 24% of the Chinese population in 31 provinces, autonomous regions and municipalities, and has 605 points of surveillance.[2]

China Chronic Disease and Risk Factors Surveillance (CDRFS, 2018) is used to present estimates of the percentage of people with overweight, obesity, prehypertension and hypertension. CDRFS is a nationwide cross-sectional study conducted every 3 years. The study was designed to measure the epidemiology of chronic disease and associated risk factors by selecting a nationally representative sample of the general population. In the 2018 survey, a total of 194 779 participants were enrolled in the survey. The overall response rate was 94.9%. [3]

The Epidemiological Survey of Thyroid disease, Iodine status and Diabetes (TIDE study) is used for the prevalence of diabetes. TIDE study included 75 880 people in 31 provinces between 2015 and 2017. This multistage, stratified sampling study selected a nationally representative sample of people aged 18 and older according to their age and sex composition of each community and the urban-rural ratio using the latest national census data. [4]

The prevalence of atrial fibrillation is obtained from China Atrial Fibrillation Epidemiologic Study (CAFES). CAFES was a representative, cross-sectional, community-based survey of adults between 2014 and 2016. A 2-stage, stratified cluster design was used to obtain a representative sample of adults (aged ≥45 years)

in the general population, covering 7 geographic regions of China (Northeast, North, Northwest, East, Central, South, and Southwest China). A total of 64 893 people were invited to participate from 39 communities (14 urban and 25 rural), and 47 841 (73.7%) completed the survey; response rates were 66.4% and 79.3% in men and women, and of 80.3% and 69.0% in rural and urban residents, respectively. [5]

1.2 Definition of key indicators

1.2.1 Overweight and obesity

For adults (≥18 years of age), this was determined using Criteria of Weight for Adults (WS/T 428–2013).[6] Being overweight was defined as having a body mass index (BMI) between 24.0 and 27.9 kg/m^2. Obesity was defined as having a BMI of ≥28.0 kg/m^2.

We also used the standards recommended by the WHO [7] that overweight is defined as 25.0 kg/m^2 ≤BMI<30.0 kg/m^2 and obesity was defined as BMI ≥30.0 kg/m^2.

1.2.2 Hypertension

The definition of hypertension and control was using Chinese Hypertension Prevention and Control Guidelines (revised in 2018) [8].

Hypertension of adults (≥18 years of age) is defined as systolic blood pressure≥ 140 mm Hg and/or diastolic blood pressure≥90 mm Hg, or self-reported antihypertensive medicine use over the past 2 weeks.

Pre-Hypertension was defined as SBP 120 to 139 mm Hg and DBP 80 to 89 mm Hg without antihypertensive medication.

Rate of hypertension awareness refers to the proportion of individuals having known hypertension (diagnosed by qualified medical institutions or doctors) and subsequently confirmed in the survey. Rate of hypertension treatment refers to the

proportion of individuals in the survey taking antihypertensive drugs over the past 2 weeks. Rate of hypertension control refers to the proportion of individuals whose blood pressure was controlled to a level below 140/90 mm Hg after treatment.

1.2.3 Diabetes

A self-reported diagnosis that was determined previously by a healthcare professional.

Newly diagnosed diabetes is defined as:

(1) ADA diagnostic criteria: Among participants without self-reported diabetes: fasting plasma glucose ⩾126 mg/dL (7.0 mmol/L), or oral glucose tolerance test: two hour plasma glucose ⩾200 mg/dL (11.1 mmol/L), or HbA1c ⩾6.5%.

(2) WHO diagnostic criteria: Among participants without self-reported diabetes: fasting plasma glucose ⩾126 mg/dL (7.0 mmol/L) or oral glucose tolerance test: two hour plasma glucose ⩾200 mg/dL (11.1 mmol/L).

Total diabetes prevalence is calculated as sum of the number of patients with self-reported diabetes and the number of patients with newly diagnosed diabetes.

Pre-diabetes is identified as those who have no diabetes but have an HbA1c level between 5.7% and 6.4%, fasting plasma glucose level between 100 mg/dL (5.6 mmol/L) and 125 mg/dL (6.9 mmol/L), or 2-hour plasma glucose level between 140 mg/dL (7.8 mmol/L) and 199 mg/dL (11.0 mmol/L).

Awareness rate is defined as the proportion of individuals with physician-diagnosed diabetes among all patients with diagnosed or undiagnosed diabetes.

Treatment rate is defined as the proportion of individuals receiving diabetic treatment medications among all patients with diabetes.

Control rate is defined as the proportion of individuals with an HbA1c level of <7.0% among patients with diabetes who are taking diabetic treatment medications.

1.2.4 Atrial fibrillation

Individuals with AF is identified based on a self-reported history of persistent AF or identified based on results of previous ECG or ECG examinations during the survey. [5]

Reference

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8. Chinese Hypertension Prevention and Control Guidelines Revision Committee, Hypertension Alliance (China), Chinese Medical Association Cardiovascular Branch, Chinese Medical Doctor Association Hypertension Professional Committee, et al. Chinese Hypertension Prevention and Control Guidelines (revised in 2018). *Chin J Cardiovascul Med* 2019; 24: 24-56.

eTable 1. ICD-10 disease code used for identification of patients with stroke and comorbidities and ICD-9- CM code used for identification of interventions or procedures

Disease	ICD-10
Stroke	
Ischemic stroke	I63
Intracerebral hemorrhage stroke	I61
Subarachnoid hemorrhage stroke	I60
Comorbidities	
Hypertension	I10
Diabetes mellitus	E11.900
Hyperlipidemia	E78.500
Atrial fibrillation	G91.900
Coronary atherosclerotic heart disease	I25.103
Cardiac arrhythmia	I49.900
Hyperuricaemia	E79.001
Sequelae of cerebral infarction	I69.300
lacunar cerebral infarction	I63.801
Encephalopathy	G31.902
Cerebral hernia	G93.501
Occlusion and stenosis of unspecified cerebral artery	I66.901
Cerebral atherosclerosis	I67.200
Pulmonary infection	J98.414
Pneumonia	J18.900
Aspiration pneumonia	J69.001
Hydrothorax	J94.804
Hypokalemia	E87.600
Hypoproteinemia	E77.801
Fatty liver	K76.000
Hyperplasia of prostate	N40.x00
Procedures	
Intracranial artery thrombectomy	39.7400x002,

	39.7401,39.7400
Carotid artery stenting CAS	0.63
Vertebral artery balloon angioplasty	00.6400x009
Intracranial artery stenting/Intracranial artery angioplasty	0.6500, 0.6200
Vertebral artery stenting	00.6102
Middle cerebral artery stenting	00.6501
Evacuation of intracerebral hematoma/evacuation of intracranial hematoma/transtemporal evacuation of intracerebral hematoma	01.3900x009, 01.2408, 01.3904
Burr-hole drainage of ventricle/Burr-hole decompression of skull	01.3901,01.2414
Stereotactic aspiration of intracranial hematoma/stereotactic puncture and drainage of intracranial hematoma/ hard tunnel puncture and drainage of intracranial hematoma	01.3905, 01.3900x013, 01.3900x003
Endoscopic drainage of hematoma	01.3906
Ventriculo-peritoneal shunt/ventrico-extracranial shunt	02.3400x002, 02.3900
Wrapping of intracranial aneurysm/Resection of intracranial vascular Malformation/Clipping of carotid aneurysm	39.5101
Resection of intracranial aneurysm	38.6100x002
Neuroendoscopic clipping of intracranial aneurysm	39.5100x004
Clipping of posterior communicating artery aneurysm	39.5104
Clipping of anterior cerebral artery-anterior communicating artery aneurysm	39.5107
Clipping of middle cerebral artery aneurysm	39.5103
Clipping of cerebral aneurysm	39.5100x007
Clipping of aneurysm	39.5100
Interventions	
Intracranial aneurysm embolization/Intracranial aneurysm coil embolization/Intracranial aneurysm embolization/Middle cerebral aneurysm embolization	39.7203, 39.7204, 39.7209, 39.7200x006
Intracranial artery stenting/Intracranial artery stent-assist coil embolization	00.6500x008, 00.6500, 39.7205
Intracranial and cervical artery occlusion	39.7500, 39.7200
Carotid aneurysm embolization	39.7206
Carotid aneurysm coil embolization	39.7207
Internal carotid embolization	39.7200x004
Carotid artery stenting CAS	00.6300
Wrapping of intracranial aneurysm	39.5201

Clipping of intracranial vascular malformation	38.8101
Other arteriorrhaphy	39.5200
Clipping of anterior cerebral artery aneurysm	39.5102
Resection of intracranial vascular malformation	38.6101
Clipping of carotid aneurysm	39.5101
Resection of intracranial aneurysm	38.6100x002
Neuroendoscopic clipping of intracranial aneurysm	39.5100x004
Clipping of posterior communicating artery aneurysm	39.5104
Clipping of anterior cerebral artery-anterior communicating artery aneurysm	39.5107
Clipping of middle cerebral artery aneurysm	39.5103
Clipping of cerebral aneurysm	39.5100x007
Clipping of aneurysm	39.5100

ICD-10, International Classification of Diseases, 10th Revision; ICD-9-CM, International Classification of Diseases, Ninth Revision, Clinical Modification.

eTable 2. Specifications of guideline- recommended performance measures

Performance measure of ischemic stroke care Acute performance measures	Performance measure definition for eligible patients
Performance measures at admission	
IV rt-PA < 4.5 Hours	Intravenous recombinant tissue plasminogen activator (IV rtPA) in patients who arrive within 3.5 hours after initial symptom onset and treated within 4.5 hours
Early antithrombotics	Antithrombotic therapy prescribed within 2 days of hospitalization, including antiplatelet or anticoagulant therapy
DVT prophylaxis	Patients at risk for deep vein thrombosis (DVT) (non-ambulatory) who received DVT prophylaxis by the end of hospital day two, including pneumatic compression, warfarin sodium, heparin sodium, or new oral anticoagulants
Dysphagia screening	Dysphagia screening prior to any oral intake
Rehabilitation assessment	Assessed for stroke rehabilitation services
Performance measures at discharge	
Antithrombotic medication	Antithrombotic therapy prescribed at discharge
Anticoagulation for atrial fibrillation	Anticoagulation prescribed at discharge for patients with atrial fibrillation or atrial flutter documented during the hospitalization
Antihypertensive medicines for patients with hypertension	Antihypertension medication prescribed at discharge for patients with history of hypertension disease or hypertension disease documented during the hospitalization
Hypoglycemia medication for diabetes mellitus	Hypoglycemic medication prescribed at discharge for patients with history of diabetes mellitus or diabetes mellitus documented during the hospitalization
Statin for lowering low-density lipoprotein ⩾100 mg/dL	Statin prescribed at discharge if low-density lipoprotein (LDL) ⩾100 mg/dL, if patient treated with lipid lowering agent prior to admission, or LDL not documented Hypoglycemia medication for diabetes mellitus

Smoking cessation	Smoking cessation intervention (counseling or medication) prior to discharge for current or recent smokers

*Eligible patients are those without any medical contraindications (eg, treatment intolerance, excessive risk of adverse reaction, patient/ family refusal, or terminal illness/comfort care only) documented as reasons for non-treatment for each of the applicable measures. Acute performance measures, except for the rtPA measure, exclude patients who died before the end of day 2 of the hospital stay. Performance measures at discharge exclude patients who died during hospitalisation.
AF, atrial fibrillation; DVT, deep vein thrombosis; IS, ischaemic stroke; LDL, low-density lipoprotein; rtPA, recombinant tissue plasminogen activator.