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Annual rates of and factors influencing inpatient and outpatient transient ischaemic attacks in Chinese population: a nationally representative cross-sectional survey

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ABSTRACT

Objectives To investigate the rates and influencing factors of transient ischaemic attack (TIA) inpatient admissions and outpatient visits in China.

Setting A door-to-door survey of 178 059 families from 155 urban and rural areas in 31 provinces in China, 2013.

Participants Total 596 536 people were assessed in the annual rate analysis, and 829 TIA patients were assessed in the influencing factor analysis.

Main outcome measures The weighted annual rates of TIA inpatient admissions and outpatient visits and the factors influencing inpatient admissions and outpatient visits for TIA patients.

Results The weighted annual inpatient admission rate per TIA patient was 25.8 (95% CI: 18.4 to 36.2) per 100 000 in the population, whereas the weighted annual inpatient admission rate for patients with TIAs was 32.5 (95% CI: 23.3 to 38.9) per 100 000 in the population. The weighted annual outpatient visit rate per TIA patient was 34.4 (95% CI: 26.2 to 45.1) per 100 000 in the population, whereas the weighted annual outpatient visit rate for patients with TIAs was 149.6 (95% CI: 127.0 to 165.5) per 100 000. The inpatient rate was higher for men than for women (OR: 2.24; 95% CI: 1.40 to 3.59; p=0.001), for TIA patients with stroke than for patients with isolated TIAs (2.93; 2.01 to 4.25; p<0.001), for TIA patients with hypertension than for TIA patients without hypertension (2.60; 1.65 to 4.11; p<0.001). The outpatient rate was higher for TIA patients with stroke than for patients with isolated TIAs (1.88; 1.33 to 2.64; p<0.001), for TIA patients with dyslipidaemia than for TIA patients without dyslipidaemia (1.92; 1.30 to 2.83; p=0.001).

Conclusions The annual rates of TIA inpatient admissions and outpatient visits in population are low, probably due to the lack of access to inpatient and outpatient services experienced by the majority of TIA patients in the population, and individuals' socio-demographic characteristics, disease histories and stroke prognosis may be associated with inpatient and outpatient TIAs.

Strengths and limitations of this study

► This is a nationally representative cross-sectional survey on transient ischaemic attack (TIA) inpatients and outpatients with professional design, implementation and case ascertainment, and the diagnosis of TIA.

► It is the first study to investigate annual rates of and factors influencing inpatient and outpatient transient ischaemic attacks in China nationwide.

► It is also the first study to investigate the direct charges associated with TIA-related inpatient admissions and outpatient visits in China nationwide.

► A recall bias existed in this cross-sectional survey, especially for deceased inpatients or outpatients within the defined periods, and elderly subjects to accurately recall TIA episodes that occurred prior to strokes.

► Indeed, it is hard to determine the causal relationships between influencing factors and TIA inpatients and outpatients in this cross-sectional survey, thus the findings need further confirmation in prospective studies.

probable transient ischaemic attacks (TIAs) nationwide, with 0.31 million new cases of TIA annually.[1] TIA patients are not managed well prior to a stroke in China,[1] although the early assessment and management of TIAs and minor strokes can result in an 80% reduction in the incidence of early recurrent strokes.[2 3] It is particularly urgent for TIA care to be integrated into the national healthcare system. However, organised stroke care, including TIA care, is still far from being implemented in the majority of hospitals in China, as in many developing countries worldwide.[4] Accurate estimates of the rates of and factors influencing the inpatient admissions and outpatient visits of patients with TIAs may be necessary for the integration of TIA care into

INTRODUCTION

In China, there are an estimated 1.35 million patients who have ever had definite or

the national healthcare system. However, no evidence of the rates of and factors influencing inpatient admissions and outpatient visits of patients with TIAs is available. Thus, we aimed to investigate the rates of and factors influencing inpatient admissions and outpatient visits of patients with TIAs based on the National Epidemiological Survey of Transient Ischaemic Attacks in China.

METHODS
Study design and participants
A nationally representative cross-sectional survey on strokes and TIAs was conducted in 157 disease surveillance points (DSPs) or survey sites of the 31 provincial regions in mainland China from 1 September 2013 to 31 December 2013 which was described in detail in previous studies.[1 5] Briefly, participants with suspected stroke or TIA symptoms were screened from the sampled populations by China's Centers for Disease Control and Prevention (CDC) investigators and further interviewed by neurologists in this study. Ultimately, all definite or probable cases of first-ever TIAs or strokes in the life time of an individual by midnight on 31 August 2013 (ie, prespecified time point of the survey) were confirmed according to diagnostic criteria.

Inquiries for the TIA participants
For each diagnosed TIA case with or without stroke, the inpatient times and charges due to TIAs or strokes following TIAs and the outpatient times and charges due to TIAs and its related comorbidities in the past year (prior to midnight on 31 August 2013) were investigated and recorded by neurologists by asking the following questions: (1) How many times have you been hospitalised in the past 1 year? How many days were the overall hospital stay? How many RMB (monetary units in China) were the overall medical charges during the total hospital stay? (2) In the past year, how many times have you visited the outpatient departments of community hospitals? How many times have you visited the outpatient departments of district/county hospitals? How many times have you visited the outpatient departments of provincial/municipal hospitals? (3) In the past month, how many times have you visited the outpatient departments of community hospitals? How many RMB were the total medical charges in the outpatient departments of community hospitals during the past month? In the past month, how many times have you visited the outpatient departments of district/county hospitals? How many RMB were the total medical charges in the outpatient departments of district/county hospitals during the past month? In the past month, how many times have you visited the outpatient departments of provincial/municipal hospitals? How many RMB were the total medical charges in the outpatient departments of provincial/municipal hospitals during the past month?

Diagnostic criteria
In this study, a TIA was defined as the sudden onset of a focal neurological symptom or sign lasting less than 24 hours, presumably brought on by a transient decrease in blood supply that rendered the brain ischaemic in the area producing the symptom.[1] In this epidemiological survey, only definite TIAs (the sudden onset of transient limb paralysis, with or without other signs, lasting up to 24 hours and leaving no significant deficits) or probable TIAs (other transient focal neurological deficits lasting up to 24 hours) were diagnosed according to the TIA definition after the neurologist completed a physical examination and reviewed disease histories and previous medical documents, including cardio-cerebro-vascular-related medical records, CT/MRI scans. The minimum criterion for definite or probable stroke was evidence of a sudden or rapid onset of neurological symptoms lasting for >24 hours or leading to death without evidence of a non-stroke cause.[5 6] Self-reported information on ethnicity, education, marital status, current occupation and medical insurance was used. Hypertension was defined as having a history of hypertension, or taking antihypertensive medication in the recent 2 weeks, having a systolic blood pressure ≥140 mm Hg or having a diastolic blood pressure ≥90 mm Hg. A history of diabetes mellitus was defined by patients' self-report of having been told by a doctor that they had diabetes mellitus or by their use of antidiabetic drugs. Atrial fibrillation was diagnosed by ECG, as per the medical records. The diagnosis of coronary heart disease included a history of myocardial infarction or angina documented in the medical records. Dyslipidaemia was defined by a diagnosis in the medical records. Current smoking (≥1 cigarette per day) and alcohol intake (any dose of alcohol, ≥1 time per week) were defined by the subjects' self-report.

Patient and public involvement
In this survey, TIA/patients who had a stroke and members of the general population were involved in all aspects of the survey, including planning, which was performed based on patients' concerns and public awareness; ethical auditing from non-medical member of the Ethics Committee; revising of the operational manual in line with suggestions made by patients and members of the public after the pilot survey and organising and mobilising of the formal survey with the help of the directors of local neighbourhood/village committees and local volunteers. Public promotion and mobilisation (including introducing posters and slogans to local communities and distributing appointment letters to residents) prior to the field survey were performed to ensure that local residents were aware of the purpose and significance of the survey and to secure their cooperation as much as possible during the field work. The TIA presentation as harbingers of a stroke event were also well recognised by the public through public promotion and mobilisation.

Statistical analysis
Weighting method
Statistical analyses were conducted with weighted data to account for the complex sampling design. Weighted

coefficients were calculated by considering the sampling weights, non-response weights and poststratification weights to obtain the national estimates. Population data from the 2010 China census were used to calculate post-stratification weights adjusted for sex (men, women), age (<24, 25 to 29, 30 to 34, 35 to 39, 40 to 44, 45 to 49, 50 to 54, 55 to 59, 60 to 64, 65 to 69, 70 to 74, 75 to 79 and 80+ years), residence (urban or rural) and geographical location (eastern, central or western China).

Estimation of nationwide annual rates of inpatient and outpatient TIAs

In this retrospective epidemiological survey, TIA inpatient and outpatient rates per TIA patient were defined as the proportion of inpatient or outpatient patients with TIAs among the sampled population in the past year, whereas the TIA inpatient admission and outpatient visit rates were defined as the total event rates of inpatient admissions or outpatient visits made by TIA patients among the sampled population in the past year. National estimates of the annual rates (and 95%) CIs of TIA inpatient admissions and outpatient visits were computed with individual final weights.

Estimation of nationwide inpatient and outpatient charges associated with TIAs

National estimates of charges (95% CIs) associated with TIA inpatient admissions and outpatient visits, weighted mean charges per admission or visit and length of stay per admission were also computed with individual final weights.

Analyses of hospital access rates among TIA patients and influence factors

Hospital access rates among TIA patients were calculated, and further compared between subgroups in the multivariate analysis. Factors influencing inpatient or outpatient (yes or no) TIA patients were separately determined after adjusting for different explanatory factors in a model using binary logistic regression analysis. The explanatory risk factors included age group (25 to 34/35 to 44/45 to 54/55 to 64/65 to 74/75 to 84/≥85 years), sex (men/women); stroke prognosis or history (TIA with stroke/isolated TIA); ethnicity (Han ethnicity/other ethnicity); education (primary school/middle school/college and higher); marriage status (single or widowed/married); occupation (retiree or home-maker/farmer/worker or employee or entrepreneur); hypertension (yes/no); history (yes/no/unknown) of diabetes mellitus, hyperlipidaemia, atrial fibrillation and coronary heart disease; smoking (regular smoking/occasional smoking/quit smoking/never smoked/unknown); alcohol consumption (regular alcohol consumption/occasional alcohol consumption/stopped consuming alcohol/never consumed alcohol/unknown); insurance (urban employee medical insurance (free medical care)/urban resident essential medical insurance/new rural cooperative medical insurance/no medical insurance);

place of residence (urban/ rural). A sensitivity analysis for the multivariable regression analysis was further performed to validate the results using only patients who experienced a TIA event between 1 September 2012 and midnight on 31 August 2013 because most of those patients should have but did not access inpatient or outpatient services in response to a TIA.

All of these statistical calculations were performed with SPSS 15.0 software (SPSS Inc, Chicago, Illinois, USA). P <0.05 was considered statistically significant.

RESULTS
Study participants
For this survey, 596 536 people (table 1) were finally evaluated in 155 DSPs, with a response rate of 80.0% among 745 538 people. The characteristics of the study sample from the national epidemiological survey of patients with TIAs in China in 2013 are shown in table 1. Among the 596 536 people evaluated, 26 596 had positive symptoms of stroke and TIA. Among them, 26 305 were further reviewed by neurologists and only 290 were missing or refused. Ultimately, both 7679 cases of stroke and 829 cases of TIAs were confirmed prior to 31 August 2013 (see figure 1). Among the 829 TIA cases, 470 cases (56.7%) had ever experienced a TIA event between 1 September 2012 and midnight on 31 August 2013.

Estimate of nationwide TIA inpatient admissions and the associated charges
In China, the weighted annual inpatient admission rate per TIA patient was 25.8 (95% CI: 18.4 to 36.2) per 100 000 in the population, whereas the weighted annual inpatient admission rate of patients with TIAs was 32.5 (95% CI: 23.3 to 38.9) per 100 000 in the population. According to the above-estimated rates, there were an estimated 338 589 (95% CI: 204 782 to 472 396) individuals with TIAs who accounted for 425 253 (252 847 to 597 658) inpatient admissions in the population in China per year. The length of stay and charges per inpatient admission were 12.6 (10.5 to 14.6) days and RMB 6334.9 (5113.7 to 7556.1), respectively. The total inpatient charges associated with TIAs in China were RMB 2 447 706 113.3 (1 408 328 146.7 to 3 487 084 079.9) or US$ 387 755 423.9 (223 101 488.6 to 552 409 359.2) per year. Both the length of stay and the inpatient charges per admission among TIA patients with stroke (16.1 (11.9 to 20.3) days and RMB 7880.0 (5685.1 to 10 074.9)) were higher than those among patients with isolated TIAs (9.5 (8.1 to 11.0) days and RMB 4955.1 (4062.6 to 5847.5)). The length of stay per admission was higher for women than for men and for urban residents than for rural residents, whereas the inpatient charges per admission and total inpatient charges associated with TIAs was higher for men than for women and for urban residents than for rural residents. (table 2)

Estimate of nationwide TIA outpatient visits and the associated charges
In China, the weighted annual outpatient visit rate per TIA patient was 34.4 (95% CI: 26.2 to 45.1) per 100 000 in

Table 1 Characteristics of the study sample from the national epidemiological survey of transient ischaemic attacks (TIAs) in China, 2013

Characteristic	Population	
	No. (rates)	Weighted rates* (95% CI)
Estimated prevalence (1 per 100 000)	829 (138.9)	103.3 (83.9 to 127.2)
Age group, n (%)		
0–24	160 382 (26.9%)	33.8% (32.5% to 35.3%)
25–34	91 435 (15.3%)	14.9% (14.2% to 15.5%)
35–44	99 582 (16.7%)	18.3% (17.6% to 19.0%)
45–54	93 763 (15.7%)	13.9% (13.4% to 14.5%)
55–64	80 155 (13.4%)	10.5% (10.0% to 11.1%)
65–74	44 840 (7.5%)	5.5% (5.1% to 5.8%)
75–84	22 200 (3.7%)	2.6% (2.5% to 2.8%)
≥85	4179 (0.7%)	0.5% (0.4% to 0.5%)
Sex, n (%)		
Men	300 192 (50.3%)	51.1% (50.8% to 51.5%)
Women	296 344 (49.7%)	48.9% (48.5% to 49.2%)
Ethnicity, n (%)		
Han	521 343 (87.4%)	91.8% (88.6% to 94.1%)
Other	75 193 (12.6%)	8.2% (5.9% to 11.4%)
Education, n (%)		
Primary school	248 916 (41.7%)	39.6% (35.9% to 43.4%)
Middle school	294 209 (49.3%)	49.0% (46.5% to 51.5%)
College and higher	51 730 (8.7%)	11.2% (9.0% to 14.0%)
Missing	1681 (0.3%)	0.19% (0.16% to 0.23%)
Marital status, n (%)		
Married	391 160 (65.6%)	60.9% (59.9% to 61.9%)
Single	116 817 (19.6%)	24.0% (22.3% to 25.8%)
Widowed	32 734 (5.5%)	4.2% (3.8% to 4.6%)
Other	53 735 (9.0%)	10.6% (8.9% to 12.6%)
Missing	2090 (0.4%)	0.25% (0.21% to 0.30%)
Occupation, n (%)		
Students	108 978 (18.3%)	23.1% (21.7% to 24.6%)
Worker	45 021 (7.5%)	8.7% (7.1% to 10.8%)
Farmer	271 068 (45.4%)	38.6% (33.5% to 44.0%)
Employee	46 676 (7.8%)	9.8% (7.5% to 12.7%)
Entrepreneurs	52 518 (8.8%)	10.2% (8.0% to 12.9%)
Retiree or homemaker	66 169 (11.1%)	8.7% (6.8% to 11.2%)
Other	4439 (0.7%)	0.70% (0.51% to 0.97%)
Missing	1667 (0.3%)	0.20% (0.16% to 0.24%)
Insurance, n (%)		
Urban employee medical insurance/free medical care	101 064 (16.9%)	17.9% (13.8% to 23.0%)
Urban resident essential medical insurance	75 335 (12.6%)	14.0% (10.8% to 17.9%)
New rural cooperative medical insurance	398 284 (66.8%)	63.2% (55.2% to 70.6%)
No medical insurance	21 853 (3.7%)	4.9% (3.7% to 6.3%)
Place of residence, n (%)		
Urban	282 945 (47.4%)	52.9% (44.3% to 61.3%)
Rural	313 591 (52.6%)	47.1% (38.7% to 55.7%)

*Complex sample weights were used to obtain nationally representative estimates.
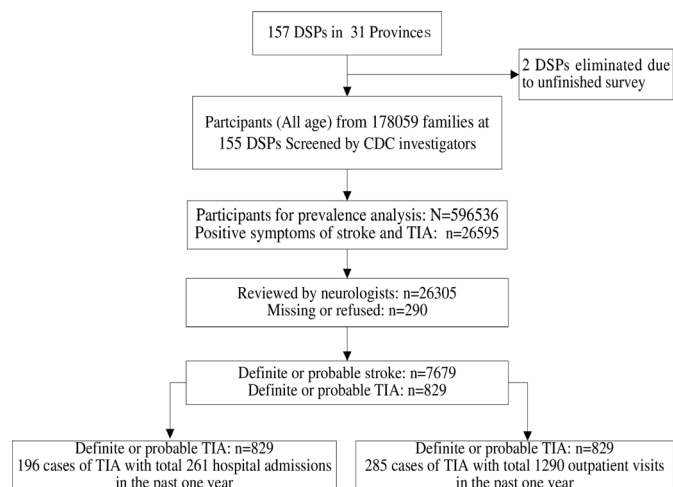
Figure 1 Flowchart for transient ischaemic attack (TIA) case ascertainment. CDC,Centers for Disease Control and Prevention; DSP,disease surveillance points.

the population, whereas the weighted annual outpatient visit rate of patients with TIAs was 149.6 (127.0 to 165.5) per 100 000 in the population. According to the above-estimated rates, there were an estimated 450 684 (95% CI: 305 000 to 596 369) patients with TIAs who accounted for 1 960 026 (1 375 872 to 2 544 181) outpatient visits in the population in China per year. The outpatient charges per visit were RMB 486.5 (150.4 to 822.7). The total outpatient charges associated with TIAs in China were RMB 292 986 336.3 (180 791 450.7 to 405 181 221.9) or US$ 46 413 677.0 (28 640 229.8 to 64 187 124.3) per year. The outpatient charges per visit and total outpatient charges associated with TIAs was higher for women than for men and for urban residents than for rural residents. (table 2)

Inpatient rates among TIA patients and influence factors

Only 23.6% of the 829 patients with TIAs were hospitalised in the past year, for a total of 261 hospital admissions attributable to the treatment of TIAs. Factors influencing TIA-related inpatient admissions included sex, stroke prognosis, marriage status, hypertension, dyslipidaemia and place of residence (table 3). The inpatient rate was higher for men than for women (OR: 2.24; 95% CI: 1.40 to 3.59; p=0.001), for TIA patients with stroke than for isolated TIA patients (2.93; 2.01 to 4.25; p<0.001), for TIA patients with hypertension than for TIA patients without hypertension (2.60; 1.65 to 4.11; p<0.001), for TIA patients with dyslipidaemia than for TIA patients without dyslipidaemia (1.71; 1.11 to 2.62; p=0.014) and for urban TIA patients than for rural TIA patients(1.63; 1.02 to 2.60; p=0.040); however, the inpatient rate was lower for married patients with a positive TIA history than for single or widowed patients with a positive TIA history (0.58; 0.35 to 0.95; p=0.029). Correspondingly, weighted rate of TIA inpatient was 35.3/100 000 in married people aged ≥25 years, lower than 57.5/100 000 in single or widowed people (p=0.011). In the sensitivity analysis, only 31.9% of the 470 TIA patients were hospitalised in the past year, and all of the above-mentioned factors but dyslipidaemia

and place of residence were further confirmed to be factors influencing the inpatient admission rate. (online supplementary table 1; marginally significant (p=0.051) for marriage status).

Outpatient rates among TIA patients and influence factors

Only 34.4% of the 829 patients with TIAs had visited outpatient clinic for TIAs in the past year, for a total of 1290 outpatient visits attributable to the treatment of TIAs. Factors influencing TIA-related outpatient visits included stroke prognosis, hypertension and dyslipidaemia (table 4). The outpatient rate was higher for TIA patients with stroke than for isolated TIA patients (1.88; 1.33 to 2.64; p<0.001), for TIA patients with hypertension than for TIA patients without hypertension (1.64; 1.14 to 2.35; p=0.008), and for TIA patients with dyslipidaemia than for TIA patients without dyslipidaemia (1.92; 1.30 to 2.83; p=0.001). In the sensitivity analysis, only 40.2% of 470 TIA patients had visited the outpatient clinic for TIAs in the past year, and all of the above-mentioned factors but hypertension were further confirmed to be factors influencing the outpatient-visit rate (online supplementary table 2).

DISCUSSION
Underestimated inpatients, outpatients and charges in transient ischaemic attacks in China

To the best of our knowledge, this is the first study to investigate inpatient and outpatient rates for patients with TIAs in China nationwide. To date, no data comparing TIA inpatient and outpatient rates have been documented in other populations. However, the TIA-related inpatient and outpatient rates were higher than the incidence rate of first-ever TIAs[1] in this survey, which is mainly attributable to recurrent TIAs or strokes after TIAs. This is also the first study to investigate the direct charges associated with TIA-related inpatient admissions and outpatient visits and the factors influencing inpatient admissions and outpatient visits for TIAs in China nationwide. The estimated total inpatient charges and outpatient charges associated with TIAs per year in China were RMB 2.45 billion and 0.29 billion, respectively. Given that the majority of TIA patients in the population did not response to TIAs or the symptoms of TIAs, the estimated total inpatient and outpatient charges associated with TIAs may be underestimated. Therefore, the current demand for TIA care is less than the actual demands in China. In fact, the low awareness and treatment rates of hypertension[7], diabetes mellitus,[8] and dyslipidaemia[9] in China seems to indirectly support our findings. The mean length of stay per admission for isolated TIA in our study was 9.5 days, which was close to the 9.4 days reported in a previous study,[10] shorter than the 11.1 days reported by a study[11] at Philipps University in Marburg, Germany, and longer than the 3.4 days reported in an American study.[12] Different systems of healthcare and finance prevent further comparisons of inpatient and outpatient charges

Table 2 Inpatients, outpatients and charges in transient ischaemic attacks in both sexes, and urban and rural areas of China in 2013

	Total	Men	Women	Urban areas	Rural areas
	Estimates (95% CI)	Estimates (95% CI)	Estimates (95% CI)	Estimates (95% CI)	Estimates (95% CI)
Inpatient admissions and charges					
Inpatient-admission rate per TIA patient (1/100 000)	25.8 (18.4 to 36.2)	29.7 (19.7 to 44.9)	21.8 (15.3 to 30.9)	29.1 (17.0 to 49.9)	22.1 (17.4 to 28.2)
Persons	338 588.8 (204 781.6 to 472 393.1)	199 308.4 (109 078.1 to 289 538.8)	139 280.4 (81 646.8 to 196 914.0)	201 873.1 (77 080.1 to 326 666.0)	136 715.8 (88 434.2 to 184 997.3)
Inpatient-admission rate (1/100 000)	32.5 (23.3 to 38.9)	38.6 (24.9 to 48.2)	26.1 (18.7 to 31.2)	37.4 (18.6 to 48.9)	26.9 (23.1 to 29.2)
Admissions	425 252.5 (252 846.9 to 597 658.1)	258 425.7 (137 893.2 to 378 958.3)	166 826.8 (99 022.7 to 234 630.8)	259 354.5 (97 019.8 to 421 689.1)	165 898.1 (107 836.5 to 223 959.6)
Length of stay/per admission (days)	12.6 (10.5 to 14.6)	11.8 (10.6 to 13.0)	13.6 (8.9 to 18.2)	13.4 (10.3 to 16.5)	11.4 (9.5 to 13.4)
Inpatient charge/per admission (RMB)	6334.9 (5113.7 to 7556.1)	6953.3 (5338.1 to 8568.5)	5381 (4282.9 to 6479.2)	7003 (5240.3 to 8765.6)	5297 (3660.7 to 6933.2)
Total inpatient charge (RMB)	2 447 706 113.3 (1 408 328 147 to 3 487 084 080)	1 658 966 994.4 (863 592 527.5 to 2 454 341 461.0)	788 739 118.9 (420 891 979.5 to 1 156 586 258.0)	1 688 508 429 (686 712 525.4 to 2 690 304 333.0)	759 197 684.3 (482 229 229.1 to 1 036 166 140.0)
Outpatient visits and charges					
Outpatient-visit rate per TIA patient (1/100 000)	34.4 (26.2 to 45.1)	34.0 (24.8 to 46.5)	34.9 (25.9 to 46.8)	34.6 (22.6 to 52.9)	34.2 (24.8 to 47.1)
Persons	450 684.3 (304 999.6 to 596 368.9)	227 518.5 (144 444.4 to 310 592.5)	223 165.8 (148 237.2 to 298 094.4)	239 394.1 (117 532.9 to 361 255.3)	211 290.1 (131 453.6 to 291 126.6)
Outpatient-visit rate (1/100 000)	149.6 (127.0 to 165.5)	156.8 (121.2 to 181.9)	142.0 (114.7 to 161.3)	138.5 (103.5 to 159.6)	162.1 (127.0 to 183.4)
Visits	1 960 026.3 (1 375 871.6 to 2 544 181.1)	1 050 789.6 (671 051.2 to 1 430 527.9)	909 236.8 (607 108.5 to 1 211 365.1)	959 380.5 (540 848.1 to 1 377 913.0)	1 000 645.8 (593 132.2 to 1 408 159.4)
Outpatient charge/per visit (RMB)	486.5 (150.4 to 822.7)	312.1 (193.7 to 430.6)	619.5 (45.1 to 1193.9)	680.6 (56.0 to 1305.3)	287.5 (72.8 to 502.3)
Total outpatient charge (RMB)	292 986 336.3 (180 791 450.7 to 405 181 221.9)	137 213 039.1 (66 730 298.6 to 207 695 779.6)	155 773 297.2 (68 438 803.6 to 243 107 790.8)	185 985 103.4 (92 628 336.3 to 279 341 870.6)	107 001 232.8 (44 774 177.8 to 169 228 287.9)

RMB, monetary units in China; TIA, transient ischaemic attack.

between countries. The mean inpatient charge was Yuan RMB 8841.4 per admission for cerebral infarction in 2014, as reported in the China Health and Family Planning Statistics Yearbook 2015,[13] which was slightly higher than the mean inpatient charge of Yuan RMB 7880.0 for TIA patients with stroke and higher than the Yuan RMB 4955.1 for isolated TIA patients reported in our study. In the Yearbook 2015,[13] the total inpatient charges for intracerebral haemorrhage and cerebral infarction in 2014 were Yuan RMB 20.7 billion and 47.0 billion, respectively, in China, but no total inpatient charges and inpatient charges per admission for TIA were reported. Similar to our study, the mean inpatient charge per admission for cerebral infarction was higher than that for TIA in Germany,[10 11] the USA[12] and Singapore.[14]

Factors influencing inpatient and outpatient transient ischaemic attacks

In this study, we investigated whether socio-demographic characteristics, disease histories, stroke prognoses and medical insurance were associated with inpatient admissions and outpatient visits and confirmed that the factors influencing TIA-related inpatient admissions were sex, hypertension and stroke prognosis, and the factors influencing TIA-related outpatient visits were dyslipidaemia and stroke prognosis. It seems logical that the presence of risk factors and poorer prognoses increased the rates of inpatient admissions and outpatient visits, and marriage may influence the rate of inpatient admissions by lowering the incidence of TIAs. In the present study, weighted incidence was 34.3/100 000 in married people

Table 3 Factors influencing inpatient admissions in patients with transient ischaemic attacks (TIAs) in China, 2013

Factors	TIA no.	Inpatient no.	%	Adjusted* OR	95% CI	P value
Age group						
25–34	6	1	16.7%	0.75	0.04 to 15.16	0.851
35–44	30	4	13.3%	0.45	0.06 to 3.20	0.424
45–54	137	25	18.2%	0.67	0.13 to 3.38	0.630
55–64	266	67	25.2%	0.69	0.15 to 3.31	0.646
65–74	265	67	25.3%	0.56	0.12 to 2.64	0.460
75–84	115	29	25.2%	0.42	0.09 to 2.05	0.282
≥85	10	3	30.0%	Reference	Reference	
Sex						
Men	393	109	27.7%	2.24	1.40 to 3.59	0.001
Women	436	87	20.0%	Reference	Reference	
Stroke prognosis or history						
TIA with stroke†	241	99	41.1%	2.93	2.01 to 4.25	<0.001
Isolated TIA	588	97	16.5%	Reference	Reference	
Ethnicity						
Han ethnicity	705	179	25.4%	1.34	0.72 to 2.49	0.357
Other	124	17	13.7%	Reference	Reference	
Education						
Middle school	314	82	26.1%	0.89	0.58 to 1.38	0.605
College and higher	28	10	35.7%	1.20	0.44 to 3.21	0.724
Primary school	487	104	21.4%	Reference	Reference	
Marriage status						
Married	679	156	23.0%	0.58	0.35 to 0.95	0.029
Single/widowed	150	40	26.7%	Reference	Reference	
Occupation						
Worker/employee/entrepreneurs	75	19	25.3%	1.10	0.54 to 2.25	0.796
Farmer	469	91	19.4%	0.78	0.40 to 1.50	0.451
Retiree or homemaker	285	86	30.2%	Reference	Reference	
Disease history						
Hypertension						
Yes	562	164	29.2%	2.60	1.65 to 4.11	<0.001
No	267	32	12.0%	Reference	Reference	
Diabetes mellitus						
Yes	121	39	32.2%	1.14	0.71 to 1.85	0.581
No	613	145	23.7%	Reference	Reference	
Unknown	95	12	12.6%	0.54	0.26 to 1.09	0.086
Dyslipidaemia						
Yes	204	73	35.8%	1.71	1.11 to 2.62	0.014
No	398	83	20.9%	Reference	Reference	
Unknown	227	40	17.6%	1.14	0.69 to 1.89	0.597
Atrial fibrillation						
Yes	35	8	22.9%	0.87	0.36 to 2.11	0.754
No	647	161	24.9%	Reference	Reference	
Unknown	147	27	18.4%	1.21	0.67 to 2.19	0.531
Coronary heart disease						

Table 3	Continued						
Factors		TIA no.	Inpatient no.	%	Adjusted* OR	95% CI	P value
Yes		148	45	30.4%	1.09	0.69 to 1.73	0.711
No		531	131	24.7%	Reference	Reference	
Unknown		150	20	13.3%	0.40	0.22 to 0.73	0.003
Smoking							
Regular smoking		149	37	24.8%	0.72	0.39 to 1.32	0.286
Occasional smoking		97	17	17.5%	0.56	0.26 to 1.22	0.144
Quit smoking		102	27	26.5%	0.57	0.27 to 1.18	0.128
Never smoked/unknown		481	115	23.9%	Reference	Reference	
Alcohol consumption							
Regular alcohol consumption		71	13	18.3%	0.72	0.32 to 1.59	0.414
Occasional alcohol consumption		172	34	19.8%	0.82	0.45 to 1.48	0.506
stopped consuming alcohol		99	26	26.3%	0.68	0.34 to 1.36	0.273
Never consumed alcohol/unknown		487	123	25.3%	Reference	Reference	
Insurance							
Urban employee medical insurance/free medical care		232	69	29.7%	0.58	0.12 to 2.82	0.503
Urban resident essential medical insurance		89	25	28.1%	0.69	0.14 to 3.44	0.651
New rural cooperative medical insurance		497	99	19.9%	0.89	0.20 to 4.10	0.885
No medical insurance		11	3	27.3%	Reference	Reference	
Place of residence							
Urban		420	123	29.3%	1.63	1.02 to 2.60	0.040
Rural		409	73	17.8%	Reference	Reference	

*All other variables in the table were adjusted for each interesting variable in a multivariate logistics regression model.

†It was meant that 241 cases of TIA with stroke included 61 cases of TIA patients with previous stroke, and 180 cases of TIA patients with subsequent.

and 57.5/100 000 in single or widowed people aged ≥25 years, respectively. Interestingly, inpatient and outpatient responses to TIA did not increase with age, and only different inpatient response to TIA was found in both sexes, rather than outpatient response. A study of TIA patients presenting to emergency departments in the USA from 2006 to 2008 found that median household income, insurance status and the hospital type affiliated with the emergency department play important roles in the decision to admit TIA patients to hospitals.[15] Another study of TIA patients presenting to emergency departments also found that differences in admission status were associated with hospital type and socio-demographic characteristics, including county of residence and insurance status.[16] Thus, the possible explanations may be complex and are probably attributable to factors unrelated to the condition of the patients. Regrettably, we could not distinguish emergency department visits from other outpatient visits in our study, although a TIA is an emergency. Medical insurance also failed to explain the differences in TIA inpatient and outpatient rates in our study.

We also noted that most of the TIA risk factors (eg, coronary heart disease, diabetes, smoking, alcohol consumption) and socio-demographic characteristics (eg, education

and insurance) were not related with inpatient admissions and outpatient visits in TIA patients in this study. The possible reasons were postulated as follows: first, generally poor awareness or responses to TIA symptoms with 24 hours disappearing in population; second, lower rate of accessing to inpatient and outpatient TIA services in TIA patients; third, recall bias in the survey. Indeed, it is hard to determine the real reason in this cross-sectional survey, thus further prospective studies are needed.

The implication of the findings

The guidelines recommend that patients with TIAs who are at high risk of stroke (that is, with an $ABCD^2$ score of 4 or above) should undergo neuroimaging and be assessed by a specialist within 24 hours of symptom onset, while those at a lower risk of stroke should be assessed within a week.[17 18] However, only a minority of high-risk TIA patients are seen within 24 hours of symptom onset in hospitals, mainly due to their failure to respond urgently to their symptoms.[19] Data from the Chinese National Stroke Registry showed that only 22% to 36% of TIA patients arrive at hospitals within 24 hours of symptom onset.[20] A community-based stroke registry in three cities in China showed that only 16.9% of patients

Table 4 Factors influencing outpatient visits in patients with transient ischaemic attacks (TIAs) in China, 2013

Factors	TIA no.	Outpatient no.	%	Adjusted* OR	95% CI	P value
Age group						
25–34	6	3	50.0%	1.44	0.16 to 13.21	0.749
35–44	30	9	30.0%	0.65	0.13 to 3.13	0.587
45–54	137	30	21.9%	0.29	0.07 to 1.17	0.081
55–64	266	95	35.7%	0.51	0.13 to 1.98	0.329
65–74	265	104	39.2%	0.60	0.15 to 2.31	0.454
75–84	115	39	33.9%	0.42	0.11 to 1.68	0.221
≥85	10	5	50.0%	Reference	Reference	
Sex						
Men	393	145	36.9%	1.18	0.79 to 1.76	0.431
Women	436	140	32.1%	Reference	Reference	
Stroke prognosis or history						
TIA with stroke†	241	114	47.3%	1.88	1.33 to 2.64	<0.001
Isolated TIA	588	171	29.1%	Reference	Reference	
Ethnicity						
Han ethnicity	705	259	36.7%	1.57	0.94 to 2.62	0.082
Other	124	26	21.0%	Reference	Reference	
Education						
Middle school	314	114	36.3%	1.16	0.79 to 1.69	0.455
College and higher	28	14	50.0%	2.17	0.88 to 5.32	0.092
Primary school	487	157	32.2%	Reference	Reference	
Marriage status						
Married	679	229	33.7%	0.80	0.52 to 1.24	0.316
Single/widowed	150	56	37.3%	Reference	Reference	
Occupation						
Worker/employee/entrepreneurs	75	25	33.3%	1.02	0.55 to 1.91	0.945
Farmer	469	150	32.0%	0.93	0.52 to 1.66	0.811
Retiree or homemaker	285	110	38.6%	Reference	Reference	
Disease history						
Hypertension						
Yes	562	222	39.5%	1.64	1.14 to 2.35	0.008
No	267	63	23.6%	Reference	Reference	
Diabetes mellitus						
Yes	121	55	45.5%	1.17	0.75 to 1.80	0.491
No	613	204	33.3%	Reference	Reference	
Unknown	95	26	27.4%	0.71	0.42 to 1.21	0.210
Dyslipidaemia						
Yes	204	94	46.1%	1.92	1.30 to 2.83	0.001
No	398	113	28.4%	Reference	Reference	
Unknown	227	78	34.4%	1.69	1.12 to 2.56	0.013
Atrial fibrillation						
Yes	35	15	42.9%	1.29	0.61 to 2.72	0.503
No	647	229	35.4%	Reference	Reference	
Unknown	147	41	27.9%	0.62	0.37 to 1.04	0.071
Coronary heart disease						

Continued

Table 4 Continued

Factors	TIA no.	Outpatient no.	%	Adjusted* OR	95% CI	P value
Yes	148	56	37.8%	0.91	0.60 to 1.39	0.668
No	531	180	33.9%	Reference	Reference	
Unknown	150	49	32.7%	1.17	0.72 to 1.90	0.520
Smoking						
Regular smoking	149	52	34.9%	0.88	0.52 to 1.49	0.646
Occasional smoking	97	27	27.8%	0.82	0.44 to 1.53	0.527
Quit smoking	102	46	45.1%	1.06	0.57 to 2.00	0.847
Never smoked/unknown	481	160	33.3%	Reference	Reference	
Alcohol consumption						
Regular alcohol consumption	71	22	31.0%	0.91	0.47 to 1.76	0.783
Occasional alcohol consumption	172	50	29.1%	0.88	0.54 to 1.46	0.632
Stopped consuming alcohol	99	46	46.5%	1.30	0.72 to 2.36	0.390
Never consumed alcohol/unknown	487	167	34.3%	Reference	Reference	
Insurance						
Urban employee medical insurance/ free medical care	232	86	37.1%	1.50	0.34 to 6.58	0.588
Urban resident essential medical insurance	89	34	38.2%	2.22	0.50 to 9.90	0.297
New rural cooperative medical insurance	497	162	32.6%	1.98	0.47 to 8.29	0.351
No medical insurance	11	3	27.3%	Reference	Reference	
Place of residence						
Urban	420	150	35.7%	0.81	0.54 to 1.21	0.298
Rural	409	135	33.0%	Reference	Reference	

*All other variables in the table were adjusted for each interesting variable in a weighted multivariate logistics regression model.
†It was meant that 241 cases of TIA with stroke included 61 cases of TIA patients with previous stroke, and 180 cases of TIA patients with subsequent.

with stroke were aware that their initial symptom represented a stroke.[4] In fact, over half of TIA patients with stroke have already developed a stroke within 2 days of symptom onset.[1 21] This implies that TIA care should be focussed on pre-TIA care as well as inpatient and outpatient care. Therefore, first, organised stroke care covering prehospital care and inpatient and outpatient services for strokes, including TIA, should be strengthened. Second, TIA clinics should also be integrated into the national healthcare system in primary, secondary and tertiary hospitals. Third, pre-TIA care, including TIA warning signs and identification, should be promoted in health education to control of hypertension and dyslipidaemia among the general public.

Strengths and limitations

The strengths of this study are its professional design, implementation and case ascertainment, and the diagnosis of TIA. Furthermore, TIA or stroke symptoms were screened by a pre-set, structured questionnaire in addition to the professional diagnosis of TIAs, guaranteeing the validity of the survey. Neurologists interviewed participants with positive TIA/stroke symptoms and ultimately confirmed 829 cases of TIA with information on the time of onset, duration and disappearance of symptoms, and a detailed record of the TIA-related inpatient admissions and outpatient visits in the past year. However, a recall bias existed in this cross-sectional survey because we could not obtain accurate TIA information for deceased inpatients or outpatients within the defined periods, even though we examined all deaths in the period. Indeed, it was also difficult for elderly subjects to accurately recall TIA episodes that occurred prior to strokes. Unlike in clinical trials, it was also difficult to trace each TIA event clearly and accurately in the population, although we attempted to do so. Also, we should be cautious with the interpretation on those factors influencing inpatient and outpatient TIAs, especially those self-reported conditions.

CONCLUSIONS

In conclusion, the annual rates of TIA inpatient admissions and outpatient visits in the population are low. The

estimated total inpatient and outpatient charge related to TIAs per year in China may be lower than those justified by the actual demands for TIA care in China, probably due to the lack of access to inpatient and outpatient services experienced by the majority of TIA patients in the population. Socio-demographic characteristics, disease histories and stroke prognoses might be associated with inpatient and outpatient TIAs. The factors influencing TIA inpatients and outpatients in the population suggested that TIA warning signs and identification should be promoted and integrated into hypertension management and cholesterol education programmes implemented in the population.

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