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Utilisation of health services among urban patients who had an ischaemic stroke with different health insurance - a cross-sectional study in China

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ABSTRACT

Objectives This study investigates the disparities in the utilisation of patient health services for patients who had a stroke covered by different urban basic health insurance schemes in China.

Design We conducted descriptive analysis based on a 5% random sample from claims data of China Urban Employees' Basic Medical Insurance (UEBMI) and Urban Residents' Basic Medical Insurance (URBMI) in 2015, supplied by the China Health Insurance Research Association.

Setting Chinese urban social insurance system.

Participants A total of 56 485 patients who had a stroke were identified, including 36 487 UEBMI patients and 19 998 URBMI patients.

Primary and secondary outcome measures The primary outcome measures include annual number of hospitalisations, average length of stay (ALOS) and average hospitalisation cost. Out-of-pocket (OOP) cost is the secondary outcome measure.

Results The annual mean number of hospitalisations of UEBMI patients was 1.21 and 1.15 for URBMI patients. The ALOS was significantly longer for UEBMI than for URBMI patients (13.93 vs 10.82, p<0.001). Hospital costs were significantly higher for UEBMI than for URBMI patients (US$1724.02 vs US$986.59 (p<0.001), while the OOP costs were significantly higher for URBMI than for UEBMI patients (US$423.17 vs US$407.81 (p<0.001). Patients with UEBMI had higher reimbursement rate than URBMI patients (79.41% vs 66.92%, p<0.001) and a lower self-paid ratio than URBMI patients (23.65% vs 42.89%, p<0.001).

Conclusions Significant disparities were found in the utilisation of hospital services between UEBMI and URBMI patients. Our results call for a systemic strategy to improve the fragmented social health insurance system and narrow the gaps in China's health insurance schemes.

Strengths and limitations of this study

- A large scale cross-sectional investigation of disparities in healthcare utilisation of patients with ischaemic strokebetween different health insurance schemes in urban China.
- Detailed data on the mean number of hospitalisations, average length of stay and hospital costs.
- Our comparisons were based on the utilisation of health services and hospital costs, but clinical outcomes were not examined
- Our sample included urban residents only, therefore our results may be not apply to rural residents.
- Out-of-pocket expenses by insurance scheme used as a secondary outcome measure.

INTRODUCTION

Expanding health insurance coverage is the main approach to strengthen household financial protection from poor health and to improve healthcare accessibility.[1 2] In 2005, the WHO encouraged its members to achieve the universal health coverage (UHC) goal that all people obtain good-quality essential health services, including promotion, prevention, treatment, rehabilitation and palliation, without enduring financial hardship.[3] In response, many countries, including China, have taken effective measures to expand their health coverage. In the process of achieving the UHC goals, low-level insurance coverage and disparities between social health insurance schemes were identified as major issues hindering equity in healthcare access.[4 5] Health services utilisation has been considered as one of the important elements of health equity.[6]

Over the past decade, China's health insurance system has improved significantly, with the insured rate increasing from 89.25% in 2009 to over 95% in 2011. Today, more than 1.35 billion Chinese people are covered by basic medical insurance.[7] Before 2015, there were two main health insurance schemes for urban residents in China: the Urban Residents' Basic Medical Insurance (URBMI) scheme for the unemployed, retired, students and children, and Urban Employees' Basic Medical Insurance (UEBMI) scheme for

employed urban workers.[8] However, wide gaps existed between the different health insurance schemes. The main disparities lay in the targeted population, source of funding, funding level and administration and benefit packages.[9 10] Some of these differences caused inequity in healthcare utilisation[10 11] and imposed differential financial burdens on households.[11] Researchers have analysed the disparities in healthcare utilisation under these two different health insurance schemes from the perspective of certain diseases. For example, patients with mental illness covered by urban insurance schemes accessed hospitals more than rural insured patients[12] and UEBMI tuberculosis patients had higher utilisation rates than their URBMI counterparts.[13] We know little about the disparities in hospital utilisation rates for other diseases. Although stroke is the most common cause of death in China, there is a paucity of research about the utilisation of stroke inpatient services under China's different health insurance schemes. For insured patients who had an ischaemic stroke, we investigated how the two basic urban insurance schemes cause inequities in healthcare utilisation and exposed households to different financial risks from medical expenses.

MATERIALS AND METHODS

Data sources

From the population of all UEBMI and URBMI payments in China, a 5% random sample of the medical information for each ischaemic stroke beneficiary was collected in 2015, including age, date of visit, health institute name, primary diagnosis (classified according to International Classification of Diseases, 10th edition (ICD-10)), city of residence, cost per inpatient treatment (including out-of-pocket (OOP) expenses) and length of hospital stay (LOS).

Indicators

The annual number of hospitalisations, average length of stay (ALOS) and average hospitalisation cost of patients who had an ischaemic stroke were the three indicators of inpatient healthcare services utilisation.[14–16] Among them, hospitalisation cost could be divided into three parts: compensation fee, OOP cost within insurance and OOP expense outside insurance.

The compensation fee was compensated by the health insurance scheme when patients used health services covered in basic medical insurance reimbursement directory. The OOP cost within insurance refers to expense paid by patients when consuming healthcare covered in the directory. While the OOP cost outside insurance was also paid by patients due to consumption of health services not covered by the directory. All costs were adjusted according to the average annual 2015 US$–RMB exchange rate: US$1.0=RMB6.2284.

Methods

Individual patients who had a stroke were divided into different groups according to factors that impacted their utilisation of inpatient health services.[17] Using ICD-10, ischaemic stroke types were defined by I63, I63.0–5 (cerebral infarction due to thrombosis of precerebral arteries, embolism of precerebral arteries, unspecified occlusion or stenosis of precerebral arteries), I63.8 and I63.9 (other and unspecified cerebral infarction). Based on bed size, location and functional orientation, hospitals in China were divided into primary hospitals, with less than 100 beds, providing basic health services to residents in a community; secondary hospitals, with 100–500 beds, providing comprehensive health services to several communities as well as medical training and regional-based research and tertiary hospitals, with over 500 beds, providing complex healthcare for several districts and undertaking advanced medical education and research.

Table 1 provides an overview comparing the differences between the UEBMI and URBMI: UEBMI offers compulsory, comprehensive insurance for employed people with a per capita fund of RMB3144 (US$505) in 2015, based on contributions from employers and employees, with an 80% reimbursement rate and basic urban wage reimbursement ceiling; URBMI is voluntary, offering limited insurance to unemployed urban residents, with a per capita fund of RMB560 (US$90) in 2015, based on a government subsidy and individual premiums, with a 70% reimbursement rate and farmer income-based reimbursement ceiling.

According to the economic development level and geographical location, we divided our hospitals into three regions: east, central and west. In terms of economic development level and medical resources, industrialised eastern China had a per capita disposable income of RMB28223.3 (US$4531.4); the less developed central region had a per capita disposable income of RMB18442.1 (US$2961.0) and the mainly agricultural and underdeveloped western region had a per capita disposable income of RMB16868.1 (US$2708.3).[18] Descriptive analysis was used to report the demographic information and all outcome indicators on patients. Since the number of hospitalisations, ALOS and hospitalisation costs data had a skewed distribution, we adopted Mann-Whitney test to identify whether the differences in patients' utilisation of inpatient health and OOP costs of these two health insurance schemes were statistically significant. Linear regression was employed to assess the impact of insurance type on healthcare utilisation and hospital costs.[19] A p value of less than 0.05 was considered statistically significant. All statistical calculations were performed using STATA V.15.0.

RESULTS

Basic information of sample

As shown in table 2, a total of 56 485 patients who had an ischaemic stroke were included in our analysis, of whom 64.60% (36 487) were covered by UEBMI and 35.40% (19 998) were covered by URBMI. The average age of UEBMI patients was 68.64 years and URBMI patients was 67.45 years; nearly half

Table 1 Comparison of medical insurance schemes for urban residents in China

	URBMI	UEBMI
Inception year	2007	1998
Eligible population	Children, students, older people, people with disabilities, other non-working urban residents	Urban, employed
Enrolment type	Voluntary	Compulsory
Number of people insured	377 million	289 million
Source of funding	Government subsidy (RMB380) and individual premium (varied by locations)	Contributory (8% of annual wage, 6% from employers and 2% from employees)
Per-capita fund	RMB560	RMB3144
Benefit package	Inpatient and catastrophic outpatient medical service	Outpatient and inpatient medical service
General outpatient services	Limited and varied by locations	Comprehensive
Rate of reimbursement (inpatient)	Over 80%, varies across cities/counties	About 70%, varies across cities/counties
Annual reimbursement ceiling	Six times income of local farmers	Six times average wage of employee in the city
Demand for payment	Once a year, always	25 years for men, 20 years for women, have no more need of contributions after retirement

Data source: 2015 National Health Statistics Annual Report.
UEBMI, Urban Employee Basic Medical Insurance; URBMI, Urban Resident Basic Medical Insurance.

of the patients (47.68%) choose secondary hospitals to have their medical treatment and 32.65% (18 443) sought medical treatment in tertiary hospitals and 46.36% (26 184) of the patients were in hospital in the central China, 36.91% (20 850) in the east and 16.73% (9451) in the western region. Compared with URBMI members, UEBMI members were more likely to be admitted to tertiary hospitals (41.24% vs 16.96%) and less likely to be admitted to primary health facilities (12.95% vs 31.93%).

Utilisation of inpatient health services for patients who had a stroke

The utilisation of patient health services for all insured, UEBMI and URBMI patients are described in table 3 by the number of hospitalisations and in table 4 by ALOS. The annual number of hospitalisations among UEBMI patients was greater than those covered by URBMI (1.21 vs 1.15; p<0.001). Further, the higher annual number of hospitalisations of UEBMI patients compared with URBMI patients differed significantly (p<0.001) according to sex and hospital level. In addition, there were statistically significant differences (p<0.001) in the ALOS between UEBMI patients and URBMI patients according to sex, age group, hospital levels and region. For example, ALOS for patients with UEBMI was 13.92 days, significantly longer than patients with URBMI patients with 10.82 days (p<0.001).

Table 5 shows that the UEBMI inpatient hospital costs were significantly higher than the URBMI group, which differed significantly according to sex, age group, hospital level and region (all p<0.001). Overall, the mean total hospitalisation costs in the UEBMI group was RMB11187.64 (US$1724.02), significantly higher than that in URBMI group (RMB6402.27 (US$986.59)).

Composition of average total hospitalisation costs

Table 6 describes the composition of average total hospitalisation costs per patient for each insurance type. Insurance only covered 62.87% of URBMI patient total hospital costs, but 75.72% of UEBMI patients. While patients with UEBMI had lower average total OOP expenses (RMB2646.42/US$407.81) than those with URBMI (RMB2746.10/US$423.17), UEBMI patients had much higher average total hospitalisation costs (RMB11187.64/US$1724.02) than URBMI patients (RMB6402.27/US$986.61). This difference in OOP expenses was mainly due to the different reimbursement rates for hospitalisation costs, which were 79.41% for UEBMI, but only 66.92% for URBMI, patients as set out in the different benefit packages in table 1. Table 6 explores these OOP expenses, which shows that patients with UEBMI had fewer OOP costs within insurance (RMB1793.35/US$276.36) than URBMI patients (RMB2072.85/US$319.43), due to the significantly higher rate of hospital cost coverage by insurance. While UEBMI patients had higher OOP cost (RMB853.06/US$128.43) outside insurance than patients with URBMI (RMB673.24/US$101.36), which means UEBMI beneficiaries consumed more health services not covered by their health insurance scheme. However, UEBMI patients had significantly lower self-paid rate (23.65%) than URBMI patients (42.89%).

The impact of insurance type on patients' healthcare utilisation

Table 7 shows the impact of insurance type on patients' healthcare utilisation. Adjusted for age, sex, region and hospital level, UEBMI patients significantly (p<0.001)

Table 2 Sample descriptive statistics

	Overall number (%)	UEBMI number (%)	URBMI number (%)	P value
Sex				<0.001
Male	32 658 (57.82)	23 445 (64.26)	9213 (46.07)	
Female	23 827 (42.18)	13 042 (35.74)	10 785 (53.93)	
Age (years)				
Mean±SD	68.22±11.12	68.64±11.06	67.45±11.20	
Age group				<0.001
0–44	1222 (2.16)	789 (2.16)	433 (2.17)	
45–59	10 825 (19.16)	6694 (18.35)	4131 (20.66)	
≥60	44 438 (78.67)	29 004 (79.49)	15 434 (77.18)	
ICD code				<0.001
I63	472 (0.84)	446 (1.22)	26 (0.13)	
I63.0	5 (0.01)	3 (0.01)	2 (0.01)	
I63.1	4 (0.01)	2 (0.01)	2 (0.01)	
I63.2	14 (0.02)	11 (0.03)	3 (0.02)	
I63.3	41 (0.07)	31 (0.08)	10 (0.05)	
I63.4	45 (0.08)	25 (0.07)	20 (0.1)	
I63.5	54 (0.10)	25 (0.07)	29 (0.15)	
I63.8	78 (0.14)	75 (0.21)	3 (0.02)	
I63.9	55 772 (98.74)	35 869 (98.31)	19 903 (99.52)	
Hospital level				<0.001
Primary	11 110 (19.67)	4725 (12.95)	6385 (31.93)	
Secondary	26 932 (47.68)	16 713 (45.81)	10 219 (51.1)	
Tertiary	18 443 (32.65)	15 049 (41.24)	3394 (16.97)	
Region				<0.001
East	20 850 (36.91)	13 960 (38.26)	6890 (34.45)	
Central	26 184 (46.36)	17 116 (46.91)	9068 (45.34)	
West	9451 (16.73)	5411 (14.83)	4040 (20.2)	

I63, I63.0–5 (cerebral infarction due to thrombosis of precerebral arteries, embolism of precerebral arteries, unspecified occlusion or stenosis of precerebral arteries), I63.8 and I63.9 (other and unspecified cerebral infarction).
UEBMI, Urban Employees' Basic Medical Insurance; URBMI, Urban Residents' Basic Medical Insurance.

used more healthcare services and had higher hospital costs than URBMI patients.

DISCUSSION

In China, the prevalence of stroke has increased at a rate of nearly 9% per year, with a high proportion in high-risk groups.[20 21] Ischaemic stroke was the most common type of stroke.[22] To our knowledge, this is the first study using a large nation-wide Chinese health insurance claims database to explore disparities in the healthcare utilisation of patients with ischaemic stroke health services under two different urban basic health insurances schemes. Our study revealed that the UEBMI group used significantly more health services and had significantly higher hospital costs than the URBMI group. Compared with URBMI patients, UEBMI patients had 1.21 versus 1.15 annual number of hospitalisations, 13.93 days versus 10.82 days ALOS and RMB11187.64 (US$1724.02) versus RMB 6402.27 (US$1027.87) average hospitalisation costs.

Patients who had a stroke with UEBMI had lower OOP costs for within insurance coverage, but higher OOP costs for outside insurance coverage, than patients with URBMI. The explanation is related to the disparity in reimbursement rates, which are illustrated in table 1.[23] The source and level of within insurance reimbursements reflect different financing for UEBMI and URBMI, which affects the amount of funds available for patients and results in different reimbursement levels and anti-risk capacity.[24] Also, higher reimbursement rates meant lower OOP expenditures, leading patients to consume more and better health services.[25] The OOP expenses for outside insurance packages were higher for the UEBMI group than the URBMI group. Patients covered by UEBMI generally have stable jobs and higher incomes,

Table 3 The annual number of hospitalisations of patients who had an ischaemic stroke

	Overall (mean±SD)	UEBMI (mean±SD)	URBMI (mean±SD)	P value
Sex				
Male	1.21±0.67	1.23±0.72	1.17±0.52	<0.001
Female	1.16±0.53	1.18±0.59	1.14±0.46	<0.001
Age group				
0–44	1.17±0.61	1.20±0.70	1.12±0.43	0.050
45–59	1.17±0.55	1.18±0.59	1.15±0.48	0.009
≥60	1.2±0.63	1.22±0.69	1.15±0.49	<0.001
ICD code				
I63	1.38±0.82	1.38±0.81	1.44±1.03	0.773
I63.0	1.19±0.58	1.21±0.65	1.14±0.45	<0.001
I63.1	1.00±0.00	1.00±0.00	1.00±0.00	—
I63.2	1.33±0.49	1.33±0.52	1.33±0.52	1.000
I63.3	1.24±0.60	1.29±0.69	1.13±0.35	0.521
I63.4	1.23±0.67	1.81±0.50	1.33±1.00	0.580
I63.5	1.30±0.78	1.20±0.70	1.41±0.87	0.416
I63.8	1.24±0.87	1.37±1.05	1.00±0.00	0.037
I63.9	1.19±0.62	1.21±0.68	1.15±0.49	<0.001
Hospital level				
Primary	1.22±0.67	1.29±0.84	1.18±0.53	<0.001
Secondary	1.17±0.57	1.20±0.63	1.14±0.45	<0.001
Tertiary	1.2±0.64	1.21±0.67	1.15±0.52	<0.001
Region				
East	1.25±0.77	1.28±0.86	1.19±0.57	<0.001
Central	1.19±0.55	1.19±0.56	1.18±0.51	0.177
West	1.07±0.37	1.11±0.45	1.03±0.20	<0.001

P values are based on Mann-Whitney test; I63, I63.0–5 (cerebral infarction due to thrombosis of precerebral arteries, embolism of precerebral arteries, unspecified occlusion or stenosis of precerebral arteries), I63.8 and I63.9 (other and unspecified cerebral infarction).

and this endowed them greater capacity and willingness to pay for additional health services.[6] Our data show that UEBMI patients were more likely to be treated at a tertiary hospital, and less likely to attend a primary hospital, than URBMI patients. Patients treated in tertiary hospitals were more likely to be prescribed expensive medicines, which fell outside the reimbursement guidelines of their insurance packages.[11]

The higher annual number of hospitalisations of the UEBMI group was likely associated with the higher ability to pay for hospital expenses due to higher income. UEBMI members were likely to use inpatient services more, while URBMI members used more outpatient services, with lower OOP and hospital expenses.[26] We speculate that patients covered by UEBMI had higher levels of education and socioeconomic status than URBMI members, as well as paying more attention to their personal health,[27] which meant UEBMI members likely visited the hospital more frequently than URBMI members. Similarly, low socioeconomic status and poor education level have been found to be important influential factors that delay patients from seeking hospital services, which reduced both ALOS and OOP expenses.[28]

Government policies and incentives reflected in UEBMI and URBMI were also leading influencing factors in the ALOS,[29] along with stroke type and stroke severity.[30] An US study[31] showed that the ALOS was significantly longer for patients who had a stroke with Medicaid than those with private insurance by more than 2 days. Under the protection of health insurance, cerebral infarction inpatients with higher financial support tended to increase their length of stay, although there may have been no medical need for more treatments.[32] We predict that the different UEMBI–URBMI benefit packages impacted ALOS in our study.[33]

We also found that patients with UEBMI had higher hospitalisation costs, which is consistent with existing studies.[34] Doctors' behaviour towards UEBMI patients partly explain these higher costs. Depending on a patient's health insurance status, different therapeutic schedules would be considered by doctors, which could result in different effectiveness of stroke treatment.[35]

Table 4 The average length of stay of patients who had a stroke

	Overall (mean±SD)	UEBMI (mean±SD)	URBMI (mean±SD)	P value
Sex				
Male	13.16±13.22	14.04±14.03	10.91±10.55	<0.001
Female	12.38±11.57	13.73±13.40	10.75±8.57	<0.001
Age group				
0–44	12.73±9.89	13.66±10.99	11.01±8.17	<0.001
45–59	11.83±9.08	12.41±9.24	10.91±8.72	<0.001
≥60	13.08±13.32	14.29±14.70	10.80±9.78	<0.001
ICD code				
I63	29.2±41.26	28.81±40.48	35.85±53.49	0.399
I63.0	9.00±4.90	9.00±3.46	9.00±8.49	1.000
I63.1	8.00±4.69	8.50±2.10	7.50±7.78	0.887
I63.2	8.57±5.29	9.00±5.90	7.00±1.00	0.582
I63.3	20.00±13.60	22.39±14.73	12.60±4.27	0.002
I63.4	12.24±6.35	14.48±7.43	9.45±3.00	0.004
I63.5	10.15±4.46	12.08±4.84	8.48±3.78	0.002
I63.8	15.33±13.69	15.55±13.92	10.00±2.65	0.495
I63.9	12.69±11.94	13.74±14.05	10.80±9.32	<0.001
Hospital level				
Primary	12.43±17.67	16.12±21.19	9.71±8.64	<0.001
Secondary	12.45±10.95	13.25±11.67	11.13±9.54	<0.001
Tertiary	13.63±10.89	13.99±11.22	12.00±9.11	<0.001
Region				
East	13.85±14.98	15.09±16.31	11.34±11.44	<0.001
Central	12.16±9.73	12.90±10.50	10.76±7.89	<0.001
West	12.45±13.46	14.21±15.64	10.10±9.30	<0.001

All values mean±SD; p values are based on Mann-Whitney test; I63, I63.0–5 (cerebral infarction due to thrombosis of precerebral arteries, embolism of precerebral arteries, unspecified occlusion or stenosis of precerebral arteries), I63.8 and I63.9 (other and unspecified cerebral infarction).
UEBMI, Urban Employees' Basic Medical Insurance; URBMI, Urban Residents' Basic Medical Insurance.

Additionally, supply-induced demand may influence the behaviour of doctors. One study found that under the influence of supply-induced demand, a higher benefit level for a health insurance scheme was associated with a stronger impact on total medical expenses.[36] There may also have been a hyper demand for medical treatment. UEBMI patients may have demanded more treatment, especially drugs, given the benefit package and the reimbursement rates of the UEBMI scheme.

In contrast to UEBMI patients, URBMI patients incurred lower hospitalisation costs. One possible explanation is that URBMI members were mainly urban unemployed and the elderly without pension, who were not in a strong financial protection to afford high hospitalisation costs. URBMI patients were more likely to forgo the same level of health services as UEBMI patients.[37] Facing possible catastrophic health expenditure, URBMI members may have reduced the use of health services, stayed in hospital for a shorter time and reduced drugs, tests and treatment compared with UEBMI members. We speculate that the high economic burden of hospital inpatient treatment meant some URBMI members, with low family incomes or unemployed, reduced the amount of inpatient treatment, or sought outpatient instead of inpatient treatment or gave up visiting hospitals.[38]

Differences in the sample characteristics also impacted our results. The UEBMI scheme covered more male patients, while the URBMI scheme covered more female patients. Males have a higher probability of having stroke and incur higher healthcare costs than females.[39 40] Regarding age, younger patients who had a stroke had higher hospitalisation costs in the URBMI subgroup, since URBMI was targeted at children, students and the non-working young, a result consistent with previous studies.[41 42] However, in the UEBMI subgroups, patients over 60 years incurred higher hospitalisation costs than those between 45 and 59 years. In the URBMI subgroup, patients over 60 years had lower hospitalisation costs

Table 5 The average hospitalisation costs of patients who had an ischaemic stroke

	Overall (mean±SD)	UEBMI (mean±SD)	URBMI (mean±SD)	P value
Sex				
Male	10 044.32±15 342.08	11 446.85±16 772.79	6475.18±10 036.24	<0.001
Female	8738.35±12 619.51	10 357.79±14 199.52	6339.98±9874.92	<0.001
Age group				
0–44	10 957.67±18 029.09	13 070.86±21 403.27	7454.93±11 482.54	<0.001
45–59	8926.78±12 728.84	10 332.90±13 376.31	6647.08±11 197.23	<0.001
≥60	9591.19±14 503.57	11 338.85±16 271.26	6307.21±9537.80	<0.001
ICD Code				
I63	14 618.74±12 019.24	14 640.77±12 189.20	14 240.85±8766.05	0.869
I63.0	6072.54±6710.57	7305.14±8994.47	4223.64±2632.68	0.683
I63.1	3190.43±1495.48	3236.72±2277.72	3144.13±1229.97	0.965
I63.2	22 449.77±32 781.83	26 855.59±35 921.04	6295.09±5948.70	0.356
I63.3	19 720.70±20 259.93	22 146.59±22 657.40	12 200.43±5475.93	0.180
I63.4	7444.69±5952.03	10 059.32±6047.21	4176.41±3950.90	<0.001
I63.5	4224.79±3402.90	6158.34±3093.81	2557.94±2738.39	<0.001
I63.8	15 161.85±12 034.31	15 444.78±12 163.95	8088.81±4808.19	0.302
I63.9	9438.86±14 277.7	11 126.59±15 935.67	6397.26±9959.84	<0.001
Hospital level				
Primary	4297.96±8332.55	6352.05±11 513.58	2777.91±3480.63	<0.001
Secondary	7776.65±9880.66	8569.51±10 781.67	6479.96±8029.87	<0.001
Tertiary	15 130.12±19 674.80	15 613.53±20 146.07	12 986.70±17 272.8	<0.001
Region				
East	11 881.32±15 794.28	13 687.18±16 850.91	8222.43±12 633.44	<0.001
Central	7836.13±12 946.00	9153.79±14 761.89	5349.01±7948.55	<0.001
West	8816.99±13 492.20	11 172.47±15 959.32	5662.16±8208.23	<0.001

P values are based on Mann-Whitney test; all costs were based on a constant 2015 RMB; I63, I63.0–5 (cerebral infarction due to thrombosis of precerebral arteries, embolism of precerebral arteries, unspecified occlusion or stenosis of precerebral arteries), I63.8 and I63.9 (other and unspecified cerebral infarction).

Table 6 Composition of mean total hospitalisation costs (RMB)

	Overall	UEBMI	URBMI	P value
Number	56 485	36 487	19 998	
Hospitalisation cost (RMB)	9493.42	11 187.64	6402.27	<0.001
Compensation fee	6811.96	8541.69	3656.17	<0.001
Reimbursement rate (%)	74.84	79.41	66.92	<0.001
Cover rate (%)	71.01	75.72	62.87	<0.001
Total OOP cost (RMB)	2681.71	2646.42	2746.10	<0.001
OOP within insurance	1892.31	1793.35	2072.85	<0.001
OOP outside insurance	789.40	853.06	673.24	<0.001
Self-paid ratio		23.65%	42.89%	<0.001

All costs were based on a constant 2015 RMB; p values were based on the Mann-Whitney test; reimbursement rate=compensation fee/(ccompensation fee+OOP within insurance); cover rate=compensation fee/hospitalisation cost; self-paid ratio refers to the total OOP costs as a proportion of the hospitalisation costs.
OOP, out of pocket.

Table 7 The impact of insurance type on patients' healthcare utilisation

	Patient visit			Length of stay			Hospital costs		
Characteristics	Coef.	Std. err.	P value	Coef.	Std. err.	P value	Coef.	Std. err.	P value
Insurance type (Ref: UEBMI)									
URBMI	−0.025	0.003	<0.001	−0.191	0.006	<0.001	−0.289	0.007	<0.001
Constant	<0.001			<0.001			<0.001		
R^2 (adjusted)	0.018			0.041			0.350		

All models were adjusted for gender, age, region and hospital level.
UEBMI, Urban Employees' Basic Medical Insurance; URBMI, Urban Residents' Basic Medical Insurance.

than those between 45 and 59 years. One explanation is that patients over 60 years covered by UEBMI had a stable retirement salary, their financial status was better than their peers covered by URBMI scheme, which led them to consume more health services.[43] Most importantly, higher hospitalisation costs were strongly related to longer length of stay,[44 45] with UEBMI patients having longer length of stays, and therefore higher hospitalisation costs, than URBMI patients.

In order to improve China's fragmented social health insurance system and narrow the gap in health insurance schemes, the government officially launched the medical security system for URBMI urban and rural residents in 2016.[46] The gap between urban and rural residents in terms of contribution levels, financial subsidies and treatment was narrowed.[47] Nevertheless, the disparities between urban–rural resident medical insurance and UEBMI remains. This strongly suggests that the further consolidation of China's social health insurance schemes is required to address access and equity in healthcare services. The key challenges are to unite the funding levels, cost-sharing methods, standards of payment systems and service provisions of the different insurance schemes.[8] Meeting these challenges can play a positive role in improving health equity. To bridge the UEBMI–URBMI gap in healthcare utilisation, we recommend the government to launch a new critical illness contributory insurance scheme covering severe diseases, such as stroke. Given differentials in family income between urban and rural residents and across cities and geographical regions, national government insurance reforms would be required. An independent risk pool of the new critical illness contributory insurance scheme could be expanded from city and prefecture level to a larger risk pool at national level. Protected by the same risk pool, residents would enjoy the same insurance welfare and economic protection, which may effectively reduce the geographical inequity in stroke patients' healthcare utilisation and expenditure. The new critical illness insurance should also set higher reimbursement rates and reimbursement cap lines, to protect patients from catastrophic health expenditure.

This study has several limitations. First, we did not examine clinical outcomes of stroke, (eg, mortality, complications, quality of life) between the two insurance schemes although different hospitalisation rates/LOS may lead to different clinical outcomes. Second, only urban residents were included in this study, our results could not reflect utilisation and expenses of rural patients who had a stroke. Third, due to lack of data, we do not know details of hospital costs for patients who had a stroke, such as fees for medical check, surgery and drug; thus, we cannot assess what health services have contributed to hospital costs most.

CONCLUSION

Large disparities existed between UEBMI and URBMI members' utilisation of ischaemic stroke health services in China, with UEBMI providing better financial support for medical expenses and lower OPP expenses. The reimbursement ratio of the two urban health insurance schemes provides a crucial policy tool for addressing the utilisation of health services. Our findings suggest that consolidating the social health insurance schemes to the higher UEBMI levels will reduce the economic burden on households caused by stroke and improve healthcare access and equity. Launching a new critical illness contributory insurance scheme covering severe diseases, such as stroke, would offer all residents a more equal access to healthcare services. These recommendations have international significance: stroke is a global disease, and effective health insurance measures are required to control it. Providing a valuable international reference point, this study identified the need for a comprehensive and integrated health insurance scheme, especially in countries where the health insurance system is fragmented.

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