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

Yong Yang,1, Xiaowei Man,1 Stephen Nicholas,2,3,4,5 Shuo Li,1 Qian Bai,1 Liuyu Huang,1 Yong Ma,6 Xuefeng Shi7

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.

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. 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. Some of these differences caused inequity in healthcare utilisation and imposed differential financial burdens on households. 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 and UEBMI tuberculosis patients had higher utilisation rates than their URBMI counterparts. 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. 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. 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 RMB28292.3 (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). 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. 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
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% (9,451) 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 among UEBMI patients was greater than those covered by URBMI (1.21 vs 1.15; p<0.001). 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 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 RMB11,187.64 (US$1,724.02), significantly higher than that in URBMI group (RMB6,402.27 (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 76.72% of UEBMI patients. While patients with UEBMI had lower average total OOP expenses (RMB26,464.42/US$4,078.81) than those with URBMI (RMB27,464.10/US$4,231.71), UEBMI patients had much higher average total hospitalisation costs (RMB11,187.64/US$1,724.02) than URBMI patients (RMB6,402.27/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 69.92% 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 (RMB1,793.35/US$276.36) than URBMI patients, while UEBMI patients had higher OOP costs outside insurance (RMB8,530.06/US$1,287.43) outside insurance than patients with UEBMI (RMB6,732.24/US$1,013.66), 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)
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. Ischaemic stroke was the most common type of stroke. 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 insurance 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. 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. Also, higher reimbursement rates meant lower OOP expenditures, leading patients to consume more and better health services. 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.
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 study31 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 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).
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. 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, 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.

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. 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. 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 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.
### 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/(compensation 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.
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 stay44 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.5 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.

**Author affiliations**

1School of Management, Beijing University of Chinese Medicine, Beijing, China
2Australian National Institute of Management and Commerce, 1 Central Avenue Australian Technology Park, Eveleigh Sydney NSW 2015, New South Wales, Australia
3Guangdong Institute for International Strategies, Guangdong University of Foreign Studies, Guangzhou, China
4School of Economics and School of Management, Tianjin Normal University, Tianjin, China
5Newcastle Business School, University of Newcastle, Newcastle, Callaghan, Australia
6China Health Insurance Research Association, Beijing, China
7National Institute of Traditional Chinese Medicine Strategy and Development, Beijing University of Chinese Medicine, Beijing, China

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**Table 7** The impact of insurance type on patients’ healthcare utilisation

| Characteristics | Patient visit | Length of stay | Hospital costs |
|-----------------|--------------|---------------|---------------|
|                 | 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       |               |               |
| R² (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.
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Ethics approval Since the claims data were an anonymised database and had no impact on patients’ health and care, the informed consent was exempted. This study was approved by the ethics committee of Beijing University of Chinese Medicine (No. 2019BZHYLL2021).

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Data availability statement The data were provided by China Health Insurance Research Association, and these are third party data. Authors in this study have the right to use this dataset, but not the right to share and distribute the data.

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ORCID iDs
Yong Yang http://orcid.org/0000-0002-7916-8679
Xuefeng Shi http://orcid.org/0000-0001-7056-2912

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