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DIRECT COST AND INDIRECT COST OF ISCHEMIC STROKE IN CHINA

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BACKGROUND

- Stroke is one of the leading causes of disabilities and death [1], and it is associated with high economic burden in China [2-8].
- In addition, stroke-related disability brings long-lasting impact on patient lives, such as productivity losses and the need for nursing care [9]. Only a few studies have reported costs due to these aspects in China [6,10].
- To account for these aspects, analyses of the economic burden of stroke should consider different types of costs, including direct medical costs, direct nonmedical costs, and indirect costs.
- **Direct medical costs** include: expenditures for healthcare services and resources, e.g., diagnosis, treatment, rehabilitation, etc. [11]
- **Direct nonmedical costs** include: costs of non-healthcare resources, e.g., transportation, food, accommodations, etc. [11]
- **Indirect costs** include: productivity losses of the patient due to disease, and the cost of time spent on informal care by family members. [11,12]
- This is the first real-world study to estimate the direct cost and indirect cost of first-ever ischemic stroke and first-year after stroke for patients in China.

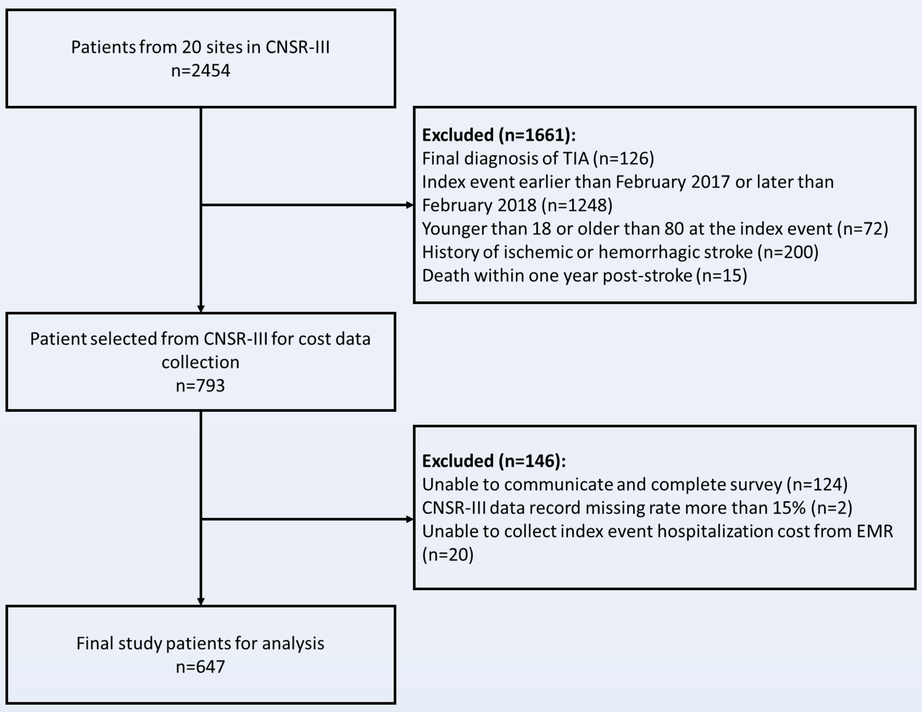
METHODS

- This study enrolled surviving patients from the nationally representative database China National Stroke Registry-III (CNSR-III) [13] who were at 18-80 years of age and hospitalized with their first-ever ischemic stroke (the index event) between 2017/02 and 2018/02.
- Patient-level demographic data, clinical characteristics (such as modified Rankin Scale (mRS) score, National Institutes of Health Stroke Scale (NIHSS) score, EuroQol 5 Dimension (EQ-5D) score, etc.), and outcome data were extracted from CNSR-III.
- Direct medical costs for the index hospitalization and follow-up hospital visits within one year were obtained from electronic medical records (EMR).
- Direct non-medical costs, indirect costs, and any additional direct medical costs within one year following the index hospitalization were collected using questionnaires.
- Total cost as the primary endpoint was calculated by summarizing the direct medical cost, direct non-medical cost, and indirect cost.
- Descriptive analysis was performed to report cost outcomes.
- Statistical testing included the Chi-square and the Mann-Whitney U test.

RESULTS

- A total of 647 patients were included. Patient attrition is shown in Figure 1.
- The follow-up EMR cost data of portion of patients could not be collected, therefore direct medical costs and total cost were not available for these 127 (19.6%) patients.

Figure 1. Study population flowchart



- Patient characteristics are shown in Table 1. The enrolled patients were 70.5% male, and 61.18±9.97 years of age.
- The majority of patients (96.9%) were treated by medical therapy. Only a few patients received inpatient surgical therapy.
- Mean admission NIHSS score was 4.13±3.85, and discharge NIHSS score was 2.71±3.01. At three months, 86.6% of patients had an mRS score 0~2:, and 13.4% with mRS score of 3~5. Mean 3-month EQ-5D utility was 0.87±0.18.
- The total cost was 57,567.48±60,036.44 CNY (n=520), with 26612.67 direct medical costs (n=520), 3,538.89 CNY direct nonmedical costs (n=647), and 28,818.16 CNY indirect costs (n=647). The cost breakdown is shown in Table 2.
- The majority of direct medical costs (72%) occurred during the index event, contrary to direct nonmedical and indirect costs, as shown in Figure 2.

Figure 2. Breakdown of cost types by index event and follow-up

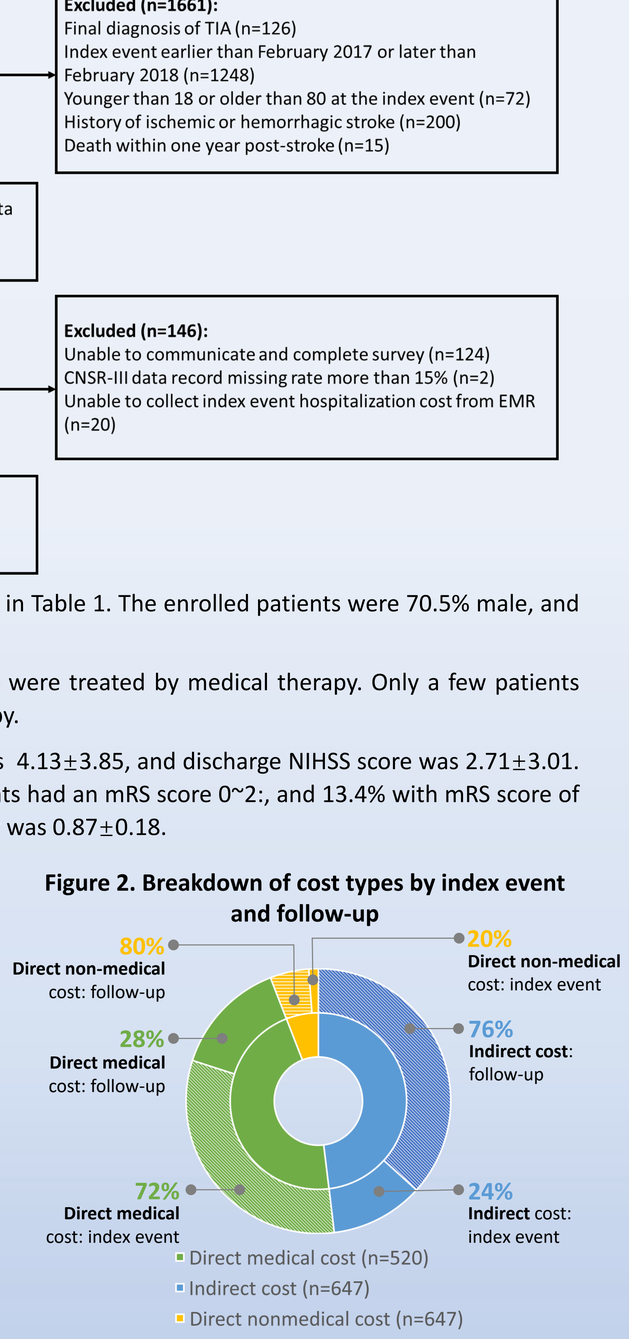


Table 1. Patient characteristics

Patient characteristics	Total (N=647)
Basic information	
Gender: male	456 (70.5%)
Age (years old);	61.18 (9.97)
Treatment	
Time from onset to arrival (hours)	24.93 (30.61)
N-Miss	115
Admission NIHSS total score	4.13 (3.85)
Endovascular therapy: stent therapy	3 (0.5%)
Inpatient therapy: medicine	627 (96.9%)
Inpatient therapy: carotid artery stenting	3 (0.5%)
Inpatient therapy: decompressive craniectomy	1 (0.2%)
Length of stay of index event (days)	13.90 (5.65)
Discharge	
Discharge NIHSS total score	2.71 (3.01)
Follow-up	
3-month mRS score	
N-Miss	5
0-2 points	556 (86.6%)
3-5 points	86 (13.4%)
3-month EQ-5D utility	0.87 (0.18)
N-Miss	4

Table 2. Cost breakdown

Cost type	Costs Mean (SD), CNY
Total cost (n=520)	**57567.48 (60036.436)**
Direct medical cost (n=520)	26612.67 (24373.40)
Index event cost (hospitalization cost)	19111.40 (14044.05)
Follow-up cost	8468.88 (18667.60)
Rehabilitation	3942.55 (8594.02)
Supportive care	1157.14 (3448.70)
Hospital care	3448.31 (15600.196)
Direct nonmedical cost (n=647)	3537.89 (27631.70)
Index event cost	703.88 (3764.55)
Food and accommodation (family members)	123.25 (811.98)
Homecare worker	566.01 (3597.98)
Transportation	14.63 (33.65)
Follow-up cost (homecare worker)	2834.00 (26656.84)
Indirect cost (n=647)	28818.16 (44839.97)
Index event cost	6813.22 (4268.58)
Patient productivity loss	1782.62 (2942.46)
Informal care	5030.60 (2526.60)
Follow-up cost	22004.95 (42439.94)
Patient productivity loss	15146.57 (33464.30)
Informal care	6858.37 (21093.75)

- Patients with a 3-month mRS score of 3-5 had significantly higher index hospitalization cost, direct medical cost, indirect cost, and total cost (all p<0.001), as shown in Table 3.

Table 3. Relationship between 3-month mRS score and costs

	3-month mRS 0-2 (N=556)	3-month mRS 3-5 (N=86)	p value
Index hospitalization cost			**< 0.001**
Mean (SD)	17647.87 (12081.04)	28331.92 (21082.87)	
Direct medical cost			**< 0.001**
N-Miss	106	19	
Mean (SD)	24922.50 (23886.24)	37472.73 (25342.89)	
Indirect cost			**<0.001**
Mean (SD)	24322.33 (38439.16)	58771.62 (67551.38)	
Total cost			**<0.001**
N-Miss	106	19	
Mean (SD)	50138.40 (45630.20)	107418.88 (106007.39)	

CONCLUSIONS

- The real-world evidence shows the significant economic burden of ischemic stroke in China during the first year following a stroke, mainly driven by indirect costs.
- Most of the direct medical cost occurred during the index event, while most of the direct non-medical cost and indirect cost occurred during follow-up.
- Patients with higher 3-month mRS scores had significantly higher costs than those with lower 3-month mRS scores.

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DISCLOSURES

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