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ORIGINAL RESEARCH

The design, rationale, and baseline characteristics of a nationwide cohort registry in China: blood pressure and clinical outcome in TIA or ischemic stroke

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Background: The relationship between poststroke blood pressure (BP) and clinical outcomes in ischemic stroke (IS) is still controversial. However, there is no large BP database for IS or transient ischemic attack (TIA) in China. This study aims to describe the rationale, study design, and baseline characteristics of a nationwide BP database in IS or TIA patients in China.

Materials and methods: The BOSS (blood pressure and clinical outcome in TIA or ischemic stroke) study was a hospital-based, prospective cohort study aiming to assess BP parameters and clinical outcome in IS/TIA patients. BP parameters were based on office BP, ambulatory BP, and home BP. Clinical outcomes included stroke recurrence, combined vascular events, and disability. Electronic case-report forms were used to record baseline and follow-up data. The patients were followed up for clinical outcomes at 3 months through face-to-face interview and at 12 months by telephone.

Results: Between October 2012 and February 2014, the BOSS registry recruited 2,608 patients from 61 hospitals, with a mean age of 62.5 years, 32.4% of whom were female, 88.9% with an entry diagnosis of IS, and 86% diagnosed with hypertension. The rates of patients lost-to-follow-up were 3.1% at 3 months and 5.1% at 1 year; 93% of patients completed ambulatory BP monitoring during hospitalization and 94.7% finished a 3-month BP diary.

Conclusion: The BOSS registry will provide important evidence about BP management in the acute phase and secondary prevention for IS/TIA patients.

Keywords: blood pressure, ischemic stroke, transient ischemic attack

Introduction

Stroke is the second-leading cause of death in the world and the leading cause of death in China.[1–4] In 2013, more than 1.9 million Chinese adults died from stroke, which represented an increase of 47.7% from 1.3 million in 1990.[4] Hypertension is the most important risk factor for stroke.[5] About 54% of strokes worldwide were attributable to high blood pressure (BP), and about 80% of the attributable burden occurred in low- or middle-income countries.[6] To date, an estimated 0.2 billion people had hypertension in China, accounting for a fifth of the total hypertensive population in the world. The rising incidence of stroke and hypertension has created a heavy burden to the Chinese health care system.

American,[7] European,[8] and Japanese[9] hypertension guidelines have confirmed the importance of ambulatory BP monitoring (ABPM) and home BPM (HBPM). Most studies[10–13] on stroke still use BP values based on traditional office measurements,

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rather than ABPM or HBPM. Moreover, BP lowering in the acute phase of ischemic stroke (IS) and secondary prevention has been a longstanding controversy.[14,15] It is not clear when the optimal time is to initiate early BP lowering or what the target-BP level is in IS and transient ischemic attack (TIA) patients. There are few BP databases[16,17] for IS patients worldwide to date. As far as we know, China, which has a fifth of the world's population, still lacks a BP database for IS and TIA patients. Given this, we performed a nationwide prospective investigation on BP parameters and clinical outcomes in our cohort of patients with acute IS or TIA from 2012 in 61 hospitals, and 1-year follow-up data of all 2,068 patients was completed in 2015. In this report, we introduce the rationale, study design, and the baseline characteristics of BOSS (blood pressure and clinical outcome in TIA or ischemic stroke).

Materials and methods

Study design

BOSS was a nationwide, hospital-based, longitudinal cohort study aiming to assess BP parameters and clinical outcome in IS/TIA patients, conducted at 61 hospitals in China. The participating hospitals were mainly tertiary urban hospitals, selected from 16 provinces and four municipalities across mainland China, including Northeast China (Heilongjiang, Jilin, Liaoning), Northwest China (Shaanxi), North China (Beijing, Tianjin, Hebei, Shanxi, Inner Mongolia), East China (Shanghai, Shandong, Jiangsu, Fujian, Zhejiang), South-central China (Henan, Hubei, Guangdong), and Southwest China (Chongqing, Sichuan). The details of centers are shown in Table S1. A total of 2,720 IS/TIA patients were consecutively enrolled from October 2012 to February 2014. An average of 42.5 participants were enrolled in each center. The study was approved by the central Institutional Review Board at Beijing Tiantan Hospital, and all patients or their designated relatives provided written informed consent. Electronic case-report forms were used to record baseline and follow-up data. The patients were followed up at 3 months through face-to face interview and at 12 months by telephone.

BP measurement

Office BP (OBP) was measured by doctors or trained nurses according to a standard measurement method recommended by the American Heart Association[18] at admission, discharge, and 3-month visit. After enrollment, each patient was assigned a semiautomatic upper-arm BP monitor (HEM-4030; Omron, Kyoto, Japan), and patients or their accompanying relatives were trained by nurses to use it. During hospitalization, BP would be measured twice daily by patients themselves or their relatives, and BP data were recorded in an assigned hospitalization BP diary. Moreover, ABPM was also completed during hospitalization. BP measurements were taken every 15 minutes during the day and every 30 minutes at night. Daytime episodes were defined from 6 am to 9:59 pm and nighttime episodes from 10 pm to 5:59 am. If the recorded BP readings are less than 80% of expected measurements, the ABPM should be repeated. Sleep diaries were compiled by patient self-report, including sleep time and awake time. At discharge, the assigned Omron BP monitor was taken home by patients. Patients would persist on measuring BP twice daily at home from the first day after discharge to 3 months after onset, and once a day from 3 months to 12 months after onset, and all BP data were recorded on the assigned home BP diaries (Figure S1). For patients with atrial fibrillation, they did not need to complete ABPM, and all of them were assigned a mercury sphygmomanometer to monitor home BP, rather than a semiautomatic monitor, because oscillometric devices may not record BP accurately in patients with arrhythmias.[19,20]

Inclusion criteria and baseline and follow-up data collection

Patients were recruited consecutively if the following conditions were met: age of 18 years or older, diagnosis of an acute IS or TIA, and within 7 days of the index event. TIA was defined as new symptomatic neurologic deterioration lasting less than 24 hours with no new infarction on neuroimaging. Acute IS was diagnosed according to World Health Organization criteria combined with brain computed tomography or magnetic resonance imaging confirmation.[21]

A standard electronic data-collection system was developed by Goodwill Information Technology Co Ltd, and the electronic case-report forms were used for baseline and follow-up data collection. All research coordinators and investigators were trained how to use this electronic data-collection system before the trial-kickoff meeting.

Baseline information included demographics, risk factors, medication use, diagnosis, disease management, and discharge status. Risk factors were defined as follows: history of hypertension (a reported history of hypertension or antihypertensive medication use), history of stroke (defined as a medical chart-confirmed history of stroke, including IS, intracerebral hemorrhage, or subarachnoid hemorrhage), coronary heart disease (a reported history of myocardial infarction or cardiac surgery, or with a final diagnosis of myocardial infarction at discharge), atrial fibrillation

(a reported history of atrial fibrillation or diagnosed using the patient's in-hospital electrocardiogram), diabetes mellitus (self-reported physician diagnosis of diabetes mellitus or use of antidiabetic drugs), dyslipidemia (self-reported physician diagnosis of dyslipidemia or use of lipid-lowering agents), current or previous smoking (defined as an individual who was a smoker at the time of the stroke or had quit smoking within 1 year), moderate or heavy drinking (two or more standard alcoholic beverages consumed per day), body mass index (calculated as measured weight divided by the square of measured height). Other clinical features included prestroke modified Rankin scale (mRS), National Institutes of Health Stroke Scale (NIHSS) score at admission and discharge, IS subtypes according to the TOAST criteria (large-artery atherosclerosis, small-artery occlusion, cardioembolism, stroke of other determined etiology, and stroke of undetermined etiology). Treatment information included medication use during hospitalization and medication with discharge (antiplatelet, anticoagulant, antihypertensive, antidiabetic, and statin medication).

Follow up information included OBP, clinical outcomes, and medication adherence. Clinical outcomes included death, disability, and vascular events. Death was assessed by vascular death (including fatal stroke, fatal myocardial infarction, and other cardiovascular death) or death for any causes. Disability was measured by the mRS from 0 to 5 (death was rated as 6) and was defined as mRS 3–5. Vascular events included stroke or TIA recurrence, myocardial infarction, heart failure, and vascular operation. Recurrent stroke was defined as a new stroke event (ischemic or hemorrhagic) or rapid worsening of an existing focal neurologic deficit lasting more than 24 hours (an increase in the NIHSS score by ≥4 points compared with baseline NIHSS score), accompanied by new ischemic changes on magnetic resonance imaging or computed tomography of the brain.[22]

Statistical analyses

In this article, analyses focused on patient baseline characteristics and describing the BP parameters. For descriptive analysis, proportions were used for categorical variables, and means with standard deviations were used for continuous variables. Data were analyzed using SAS version 9.1.3 statistical software (SAS Institute, Cary, NC, USA).

Results

From October 2012 to February 2014, 2,720 IS/TIA patients from 64 hospitals were registered. Three hospitals were eliminated because most of their enrolled patients did not complete ABPM or HBPM, so all 109 patients enrolled in these three hospitals were excluded. Moreover, three patients were removed, because their baseline information were absent. We included a total of 2,608 consecutive patients as our cohort.

We followed up the cohort patients for 1 year; 82 (3.1%) patients were lost to follow-up at 3 months, and 132 (5.1%) patients were lost to follow-up at 1 year. A detailed patient-recruitment flowchart is illustrated in Figure 1. Of 2,608 patients, the mean age was 62.5 years, 32.4% were females, 88.9% had an entry diagnosis of IS, and 86% was diagnosed with hypertension. Other characteristics are summarized in Table 1.

Table 2 shows the BP parameters based on OBP, ABP, and HBP. Mean OBP was 150.53±20.67/86.44±12.58 mmHg at admission, 136.94±13.89/80.29±9.71 mmHg at discharge, 134.51±11.94/80.52±8.60 mmHg at the 3-month visit. Visit-to-visit systolic BP (SBP) variability based on OBP was 13.11±9.05 mmHg, 24-hour SBP variability based on ABPM was 15.35±4.42 mmHg, and day-to-day SBP variability based on HBPM was 8.62±4.1 mmHg. ABP data showed that 70% of patients had morning hypertension, 51.1% had nocturnal hypertension, and 27.7% were reverse dippers.

Medication information is described in Table 3. Proportions of antihypertensive medication during hospitalization, at discharge, and at 3 months were 65.9%, 68.5%, and 67.6%; 93% of patients completed ABP monitoring, 94.7% of patients completed their 3-month BP diary. Detailed information about ABPM- and BP-diary completion is reported in Table 4. As to clinical outcomes, rates of stroke recurrence, combined vascular events, and mortality are listed in Table 5.

Discussion

To our knowledge, BOSS is the first nationwide BP database including the most comprehensive BP information for IS/TIA patients in China, and will provide important BP parameters for further investigation in the management of acute IS and secondary prevention of IS. There were three types of BP monitoring in this study: OBPM, ABPM, and HBPM. Because ABPM offers specific advantages over OBPM, such as providing a much larger number of readings, identifying white-coat and masked hypertension phenomena, and supplying nocturnal hypertension and dipping patterns, European Society of Hypertension practice guidelines for ABPM[23] point out that ABPM improves prognostic accuracy in target-organ damage and cardiovascular morbidity and mortality compared with OBPM. However, to date most

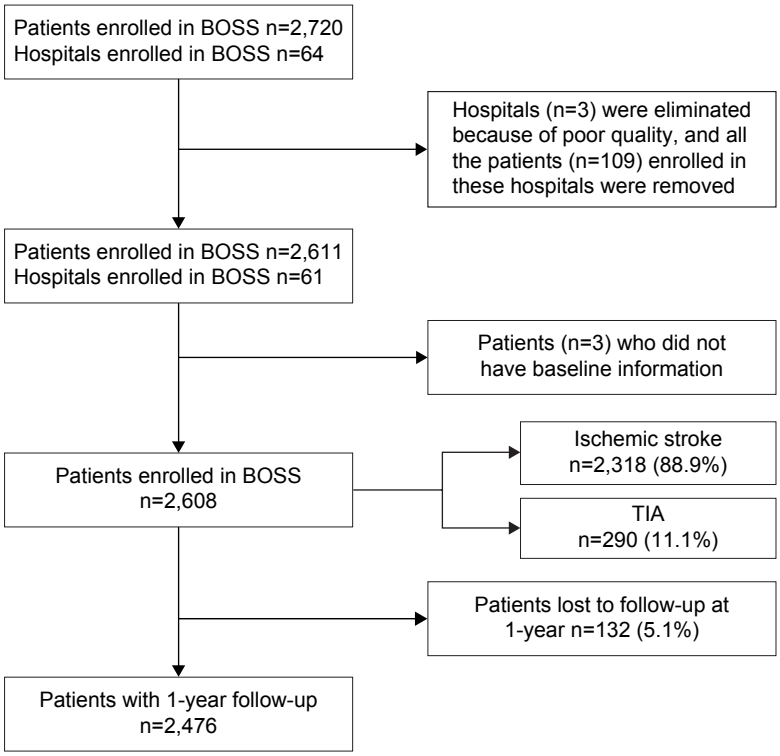

Figure 1 Patient-recruitment flowchart.
Abbreviations: BOSS, blood pressure and clinical outcome in TIA or ischemic stroke; TIA, transient ischemic attack.

Table 1 Baseline characteristics of the study population

Variable	All (n=2,608)	Missing
	n (%)/mean ± SD	n (%)
Stroke subtype		0
IS	2,318 (88.9)	
TIA	290 (11.1)	
Female	845 (32.4)	0
Age (years)	62.5±11.1	0
Current or previous smoker	1,124 (43.2)	4 (0.2)
Moderate or heavy drinking	451 (17.3)	4 (0.2)
Body mass index, median (Q1–Q3)	24.6 (22.9–26.6)	92 (3.5)
History of hypertension	1,837 (70.6)	4 (0.2)
History of stroke	618 (23.8)	6 (0.2)
History of TIA	102 (3.9)	6 (0.2)
Hypertension with discharge diagnosis	2,238 (86)	7 (0.3)
Diabetes mellitus with discharge diagnosis	739 (28.4)	7 (0.3)
Dyslipidemia with discharge diagnosis	1,083 (41.7)	8 (0.3)
Coronary heart disease with discharge diagnosis	328 (12.6)	8 (0.3)
Atrial fibrillation with discharge diagnosis	104 (4)	7 (0.3)
NIHSS score on admission	3.1±3.4	49 (1.9)
Ischemic stroke subtype		19 (0.7)
Large-artery atherosclerosis	1,358 (59.1)	
Cardioembolism	89 (3.9)	
Small-artery occlusion	776 (33.8)	
Other	76 (3.3)	

Abbreviations: IS, ischemic stroke; NIHSS, National Institute of Health Stroke Scale; SD, standard deviation; TIA, transient ischemic attack.

stroke studies[24–27] still use OBPM, and we found that the conclusion of these studies about the relationship between BP level and stroke outcomes remains controversial, especially for IS/TIA patients. It is urgent to establish a large ABPM database in relation to stroke outcome, like IDACO (international database of ambulatory blood pressure in relation to cardiovascular outcome).[16] BOSS has an independent and complete ABPM database, in which there are 93% of total patients and more than 85% of patients with at least 80% of expected measurements during 24-hour recording.

HBPM is also recommended by guidelines.[7–9] HBPM seems to be more closely associated with hypertensive end-organ damage than clinic BP, even for a low number of measurements. In BOSS, uniform devices were used to measure home BP to avoid measurement error. In addition, BP data were recorded on each day, so BP variation could be calculated as day-to-day variability, rather than visit-to-visit variability, which was used in most previous studies.[28–30] It is worth noting that the completion rate of the 3-month BP diary was as high as 94.7%, which could supply high-quality data to calculate BP parameters.

In addition, adherence to secondary prevention medication in IS and TIA patients was another focus in BOSS. Adherence was defined in consistence with the AVAIL study,[31]

Table 2 BP parameters based on OBP, ABP, and HBP

Variable	All (n=2,608)	Missing
	Mean ± SD	n (%)
OBP		
SBP on admission	150.5±20.7	50 (1.9)
SBP at discharge	136.9±13.9	39 (1.5)
SBP at 3 months	134.5±11.9	225 (8.6)
DBP on admission	86.4±12.6	50 (1.9)
DBP at discharge	80.3±9.7	41 (1.6)
DBP at 3 months	80.5±8.6	225 (8.6)
Visit-to-visit BP variability		
Systolic, mmHg	13.1±9.1	17 (0.7)
Diastolic, mmHg	7.8±5.5	17 (0.7)
ABP		
Average 24-hour BP		
Systolic, mmHg	141.7±18.2	182 (7)
Diastolic, mmHg	84±13	182 (7)
Average 24-h HR, bpm	69.9±9.6	185 (7.1)
Average daytime BP		
Systolic, mmHg	143±18.3	182 (7)
Diastolic, mmHg	85.1±13.3	182 (7)
Average daytime HR, bpm	71.4±9.8	185 (7.1)
Average nighttime BP		
Systolic, mmHg	137.4±20.4	213 (8.2)
Diastolic, mmHg	80.4±13.4	213 (8.2)
Average nighttime HR, bpm	64.9±9.9	216 (8.3)
Morning hypertension, n (%)	1,684 (70)	204 (7.8)
Nocturnal hypertension, n (%)	1,223 (51.1)	213 (8.2)
Circadian rhythm		213 (8.2)
Extreme dippers, n (%)	38 (1.6)	
Dippers, n (%)	434 (18.1)	
Nondippers, n (%)	1,260 (52.6)	
Reverse dippers, n (%)	663 (27.7)	
24-hour BP variability		
Systolic, mmHg	15.4±4.4	183 (7)
Diastolic, mmHg	11.6±4.1	183 (7)
HBP		
Average BP		
Systolic, mmHg	134.1±12.3	139 (5.3)
Diastolic, mmHg	79.4±9.4	139 (5.3)
Average morning BP		
Systolic, mmHg	134.5±12.7	142 (5.4)
Diastolic, mmHg	79.8±9.6	142 (5.4)
Average evening BP		
Systolic, mmHg	134.5±12.7	142 (5.4)
Diastolic, mmHg	79.8±9.6	142 (5.4)
Day-to-day BP variability		
Systolic, mmHg	8.6±4.1	139 (5.3)
Diastolic, mmHg	7±7.2	139 (5.3)

Abbreviations: BP, blood pressure; OBP, office BP; ABP, ambulatory BP; HBP, home BP; SD, standard deviation; HR, heart rate; SBP, systolic BP; DBP, diastolic BP.

Table 3 Medication information

Variable	All (n=2,608)	Missing
	n (%)	n (%)
History of medication		
Antiplatelet	544 (20.9)	4 (0.2)
Anticoagulant	14 (0.5)	4 (0.2)
Statin	258 (9.9)	4 (0.2)
Antidiabetic	465 (17.9)	4 (0.2)
Antihypertensive	1,416 (54.4)	4 (0.2)
Medication during hospitalization		
Antiplatelet	2,523 (97)	7 (0.3)
Anticoagulant	200 (7.7)	8 (0.3)
Statin	2,332 (89.7)	7 (0.3)
Antidiabetic	650 (25)	7 (0.3)
Antihypertensive	1,714 (65.9)	8 (0.3)
CCB	1,340 (78.2)	
ACEI	286 (16.7)	
ARB	396 (23.1)	
Diuretic	113 (6.6)	
β-Blocker	135 (7.9)	
Others	28 (1.7)	
Medication with discharge		
Antiplatelet	2,434 (96.3)	80 (3.1)
Anticoagulant	29 (1.1)	80 (3.1)
Statin	2,167 (85.7)	80 (3.1)
Antidiabetic	547 (21.6)	80 (3.1)
Antihypertensive	1,731 (68.5)	80 (3.1)
CCB	1,337 (77.2)	
ACEI	227 (13.1)	
ARB	461 (26.6)	
Diuretic	108 (6.2)	
β-Blocker	182 (10.5)	
Others	9 (0.5)	
Medication at 3 months		
Antiplatelet	2,244 (94.7)	238 (9.1)
Anticoagulant	28 (1.2)	240 (9.2)
Statin	1,846 (77.9)	239 (9.2)
Antidiabetic	485 (20.5)	239 (9.2)
Antihypertensive	1,600 (67.6)	240 (9.2)
CCB	1,223 (76.4)	
ACEI	205 (12.8)	
ARB	426 (26.6)	
Diuretic	76 (4.8)	
β-Blocker	165 (10.3)	
Others	8 (0.5)	

Abbreviations: CCB, calcium-channel blocker; ACEI, ACE inhibitor; ARB, angiotensin-receptor blocker.

which provided the possibility of comparison of medication adherence of secondary prevention between Chinese and American patients.

Fortunately, the rate of loss to follow-up of BOSS was only 3.1% at 3 months and 5.1% at 1 year, which can offer credible event outcomes. However, we found the event rate of BOSS to be much lower than historical cohorts, eg, the 1-year risk of stroke in historical cohorts was 17.7% in CNSR,[24] 12.3% in CHANCE,[32] and 12.2% in SAMMPRIS[33] compared with 6.1% in our cohort. It is worth noting that recently the TIAregistry.org project[34] also reported a very low risk of stroke after a TIA or minor stroke: 3.7% at 90 days and 5.1% at 1 year after symptom onset, which is close to our cohort. The lower event rates in our cohort may be explained

Table 4 ABPM- and BP diary-completion information

Variable	All (n=2,608)	Missing
	n (%)	n (%)
Completion of ABPM	93%	
Monitoring length (hours)		183 (7)
≥24	1,192 (49.2)	
≥20, <24	1,141 (47.1)	
≥14, <20	54 (2.2)	
<14	38 (1.6)	
Successful readings		183 (7)
≥80%	2,144 (88.4)	
≥60%, <80%	203 (8.4)	
<60%	78 (3.2)	
Including 5–7 am duration	2,329 (96.1)	184 (7.1)
Completion of 3-month BP diary	94.7%	
Total monitoring length (days)		138 (5.3)
≥60, <90	2,363 (95.7)	
≥30, <60	39 (1.6)	
≥7, <30	59 (2.4)	
<7	9 (0.3)	

Abbreviations: ABPM, ambulatory blood pressure monitoring; BP, blood pressure.

HBPM improving not only BP-medication adherence but also overall compliance with secondary prevention treatment. Our study showed that adherence rates of antiplatelet, statin, and antihypertensive medication use at 3 months were similar to the rates at discharge (see Table 3).

This registry has potential limitations. The first limitation is the different type of device and analysis software for ABPM used in each site. Given this, the original BP data of all of the patients were re-entered in EpiData and all of the BP-composite parameters were recalculated using SAS software. Second, although 94.7% of patients completed 3-month BP diary in this study, only 40% of the patients returned their diaries for recording HBP from 3 months to 1 year after symptom onset. Third, telephone but not face-to-face follow-up was adopted at 1 year. For patients with clinical events at 1-year telephone follow-up, we would further confirm this event. Each case fatality was either confirmed on a death certificate from the local citizen registry or from the attended hospital. In cases of lack of local citizen-registry information or death without hospitalization, case fatality was deemed to be reliable if death was reported on two consecutive follow-up periods from different proxies. We would call back patients with nonfatal events for a face-to-face follow-up or carry out a home visit. Fourth, according to the protocol of this registry, all patients were required to be consecutively enrolled. However, in consideration of HBP monitoring, more mild patients were recruited, which would lead to a selection bias. Fifth, this was a mainly ethnically Chinese cohort, which did not include white and black people.

Table 5 Clinical event outcomes

Outcomes	Event rate, n (%)
Recurrence rate	
3-month	125 (4.8)
1-year	159 (6.1)
Combined vascular event rate	
3-month	146 (5.6)
1-year	207 (7.9)
Mortality	
3-month	21 (0.8)
1-year	51 (2)

Conclusion

This study introduced the design, rationale, and baseline characteristics of BOSS, which was a nationwide, hospital-based, longitudinal cohort study aiming to assess BP parameters (based on OBPM, ABPM, and HBPM) and clinical outcome in IS/TIA patients. The BOSS registry will provide important evidence about BP management in the acute phase and secondary prevention for IS/TIA patients.

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Disclosure

The authors report no conflicts of interest in this work.

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Supplementary materials

Table S1 Participating hospital information

Location	Name	Grade	PI
North China			
Beijing	Beijing Tiantan Hospital, Capital Medical University	III	Xingquan Zhao
Beijing	Beijing An Zhen Hospital, Capital Medical University	III	Qi Bi
Beijing	Beijing Friendship Hospital	III	Jimei Li
Beijing	Third Hospital of Peking University	III	Dongsheng Fan
Beijing	Beijing Hospital	III	Tao Gong
Beijing	People's Hospital of Peking University	III	Xuguang Gao
Hebei	Second Hospital of Hebei Medical University	III	Guohua Zhang
Hebei	First Hospital of Handan	III	Yiping Wu/Jie Lin
Hebei	Cangzhou Central Hospital	III	Junling Zhang
Hebei	Shijiazhuang Central Hospital	III	Wanying Shi
Hebei	Third Hospital of Hebei Medical University	III	Junyan Liu
Hebei	People's Hospital of Hebei	III	Peiyuan Lv
Inner Mongolia	Baogang Hospital	III	Dong Wang
Shanxi	Second Hospital of Shanxi Medical University	III	Guanglai Li
Shanxi	Changzhi People's Hospital	III	Lili Zhao
Tianjin	Fourth Central Hospital of Tianjin	III	Chunling Ji
Tianjin	Tianjin Huanhu Hospital	III	Yong Ji
Tianjin	Tianjin Binhai People's Hospital	II	Bin Li
Northeast China			
Heilongjiang	First Machine Factory Workers Hospital of Qiqihar	II	Chunling Yang
Jilin	Jilin Central Hospital	III	Hanyi Zhang
Jilin	First Hospital of Jilin University	III	Jiachun Feng
Liaoning	First Hospital of Liaoning Medical University	III	Rubo Sui
Liaoning	Hospital of Dalian Economic and Technological Development Zone	II	Ying Lian
Northwest China			
Shaanxi	Xi'an 141 Hospital	II	Qiuwu Liu
East China			
Fujian	Xiamen Second Hospital	III	Jianping Niu
Jiangsu	First Hospital of Suzhou University	III	Zhuan Xu
Jiangsu	Second Hospital of Suzhou University	III	Heqing Zhao
Jiangsu	Nanjing First Hospital	III	Junshan Zhou
Jiangsu	Lianyungang Traditional Chinese Medicine Hospital	III	Lejun Li
Jiangsu	Gulou Hospital of Nanjing University Medical College	III	Zhongyuan Wang
Shandong	People's Hospital of Zibo Linzi	III	Yongliang Cao
Shandong	Affiliated Hospital of Qingdao University	III	Xudong Pan
Shandong	Hospital of Shandong Province	III	Yifeng Du
Shanghai	East Hospital of Yangpu District	II	Fei Li
Shanghai	Shanghai Tongji Hospital	III	Zhiyu Nie
Shanghai	Central Hospital of Shanghai Yangpu	III	Xin Li
Shanghai	Sixth People's Hospital of Shanghai Jiaotong University	III	Xiaojiang Sun
Shanghai	Branch of Shanghai First People's Hospital	II	Shaoshi Wang
Shanghai	Public Hospital of Shanghai Pudong New Area	II	Xuelian Yang
Shanghai	Xinhua Hospital of Shanghai Jiaotong University Medical Department	III	Zhenguo Liu
Shanghai	Ruijin Hospital of Shanghai Jiaotong University Medical Department	III	Shengdi Chen
Zhejiang	First People's Hospital of Taizhou	III	Zhimin Wang
Zhejiang	First Hospital of Wenzhou Medical University	III	Chengye Zhou
Zhejiang	First Hospital of Zhejiang University Medical College	III	Benyan Luo
Zhejiang	Hangzhou First Hospital	III	Guozhong Niu
Zhejiang	Shaoyifu Hospital of Zhejiang University Medical College	III	Xingyue Hu
Zhejiang	No 2 Hospital of Zhejiang University Medical College	III	Baorong Zhang

(*Continued*)

Table S1 (*Continued*)

Location	Name	Grade	PI
South-central China			
Guangdong	Jiangmen Central Hospital	III	Jianxin Zhong
Guangdong	First Hospital of Jinan University	III	Anding Xu
Guangdong	First People's Hospital of Foshan	III	Yukai Wang
Guangdong	First People's Hospital of Guangzhou	III	Xiaoping Pan
Guangdong	Third Hospital of Zhongshan University	III	Zhengqi Lu
Guangdong	Zhujiang Hospital	III	Zhenhua Liu
Guangdong	People's Hospital of Shenzhen	III	Xiaofan Chu
Henan	First Hospital of Zhengzhou University	III	Yuming Xu
Hubei	Wuhan Union Hospital, Tongji Medical College of HUST	III	Yuanjin Guo
Hubei	Wuhan Neurosurgical Hospital	III	Yuhua Chen
Hubei	Wuhan First Hospital	III	Guohua Chen
Hubei	Wuhan Zhongshan Hospital	III	Xiaorong Deng
Hubei	Xinhua Hospital of Hubei	III	Kang Xu
Southwest China			
Sichuan	Third People's Hospital of Chengdu	III	li Gao
Sichuan	People's Hospital of Sichuan	III	Wenbin Wu
Chongqing	Daping Hospital of Third Military Medical University	III	Huadong Zhou
Chongqing	First Hospital of Third Military Medical University	III	Kangning Chen

Abbreviations: PI, principal investigator; HUST, Huazhong University of Science and Technology.

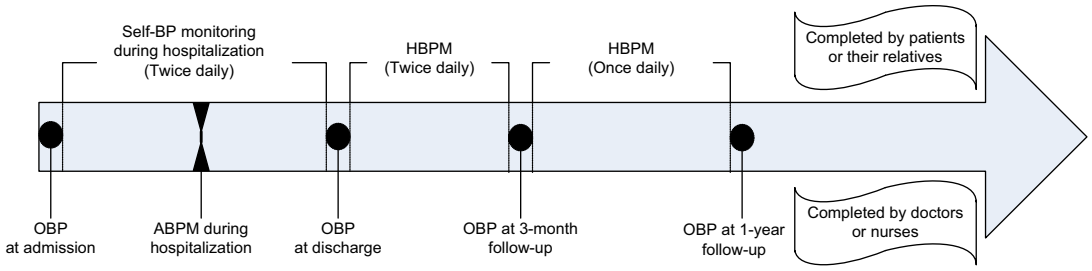

Figure S1 Design of the BOSS study.
Abbreviations: BOSS, blood pressure and clinical outcome in TIA or ischemic stroke; BP, blood pressure; OBP, office BP; ABPM, ambulatory BP monitoring; HBPM, home BPM; TIA, transient ischemic attack.