Effect of Intensive Training on Stroke Prevention and Management Ability of Community Doctors: A Cross-Sectional Study

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Research Article

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Abstract

Background: Prevention and treatment of stroke are very important to reduce the incidence of stroke-related disability and the associated death. This study aimed to investigate the current ability of community doctors in stroke management in the Jinjiang district of Chengdu, China, and the effect of intensive training on stroke prevention and management ability of these doctors.

Methods: A self-designed questionnaire was used to investigate the current status of stroke management by community doctors in the Jinjiang district. Subsequently, a series of intensive stroke management training courses for community doctors was designed according to the relevant guidelines for cerebrovascular accident prevention and treatment in China. All community doctors were trained, and their ability to treat and prevent stroke was reassessed using the self-designed questionnaire.

Results: Of the 450 questionnaires issued, 370 (74%) and 389 (77.8%) community doctors were enrolled before and after intensive training, respectively. The results showed that the stroke management ability of community doctors improved after intensive training ($p < 0.05$), including pre-hospital identification and management of stroke, and management of its risk factors.

Conclusions: The stroke management ability of community doctors in the Jinjiang district of Chengdu can be improved by promoting intensive training.

Background

Stroke is a disease that may lead to disability and death, and acute ischemic stroke (AIS) accounts for 80% of all stroke events [1]. Since the results of the multicenter randomized clinical trial of endovascular treatment for acute ischemic stroke in the Netherlands (MR-CLEAN) were published in 2012 [2], the method and time window for the treatment of AIS have been constantly updated [3-5]. AIS treatment involves pre-hospital identification, evaluation, and treatment; secondary prevention; rehabilitation; and other procedures. A few studies [6, 7] have reported that the prevention and treatment ability of Chinese community doctors required improvement. Only when these doctors fully grasp the principles of diagnosis and treatment can patients receive the most timely and appropriate treatment. According to the existing medical services model in China, the place of treatment for most patients and site of primary diagnosis is a community hospital. The purpose of this study was to investigate the current standard of stroke management among community doctors in the Jinjiang district of Chengdu and to re-evaluate their ability after intensive training, to determine the effectiveness of intensive training.

Methods

Sample

We conducted a survey of community doctors from nine communities (Chunxi, Yanshikou, Niushikou, Hongsha, Jinjiang, Lianxin, Wanke, Quan subtree, and Daci temple) in the Jinjiang district of Chengdu

(China) from February 2017 to February 2019. According to the method for estimating the minimum sample size of quantitative data recommended by the Chinese Residents of Nutrition and Health Survey in 2002, 450 community doctors in Jinjiang district was considered an appropriate sample number and these doctors were randomly selected. A cluster sampling method was adopted, selecting 50 doctors in each community.

Ethical approval for this study was obtained from the Medical and Health Research Ethics Committee of the Second People's Hospital of Chengdu, China. Written informed consent was obtained from all the participants. All methods were carried out in accordance with relevant guidelines and regulations.

Survey contents

Based on the Chinese guidelines for the diagnosis and treatment of AIS in 2010 and the Chinese guidelines for the secondary prevention of ischemic stroke and transient ischemic attack (TIA) in 2010, a questionnaire on the current status of stroke management ability of community doctors was designed to conduct a cluster sampling survey among residents from nine communities in the Jinjiang district [6]. The questionnaire contained 23 questions, which were divided into three main sections:

- (1) Basic information: sex, age, education, title, specialty before engaging in community health services, general practitioner training status, time spent performing clinical work, engagement in community health services, etc.
- (2) Concepts related to early recognition and emergency treatment for stroke: pre-hospital stroke identification, assessment (including knowledge of stroke warning signs), and processing (awareness of thrombolytic therapy and its time window; airway management; assessment of circulation; monitoring of heart function, inhaled oxygen supply, and blood glucose; establishment of intravenous route; and transfer of patients to the nearest comprehensive stroke center as soon as possible).
- (3) Knowledge about secondary stroke prevention: risk factors for stroke; definition and management of TIA; general and ideal goal for target blood pressure, HbA1c, and international normalized ratio levels; awareness of statin, warfarin, and antiplatelet therapies and their side effects. We conducted stroke health education activities with the theme "understanding stroke" and evaluated the outcome. We designed a series of intensive stroke management training courses for community doctors according to the relevant guidelines for cerebrovascular prevention and treatment in China [6-8], including the management of major modifiable risk factors for stroke (hypertension, smoking, diabetes, carotid stenosis, atrial fibrillation, dyslipidemia, lack of physical exercise, unhealthy dietary habits, alcohol consumption, drug abuse, and obesity). Intensive training was conducted through face-to-face lectures, online training, and distribution of handouts and information manuals by experts in the area. The doctors were reassessed after the intensive training, using the self-designed questionnaire, to determine whether the training could improve their stroke management ability.

Statistical analysis

All statistical analyses were performed using IBM SPSS software, V. 22.0 (IBM Corporation, Armonk, NY, USA). Descriptive statistical analysis was performed to assess the general characteristics of respondents before and after the training. Continuous and normally distributed variables were expressed as the mean $\pm$ standard deviation, and variables not normally distributed were expressed as medians (interquartile ranges). Categorical data were described as frequencies and percentages. A non-parametric test was performed to compare the influence of different factors as well as the effect of intensive training on the community doctors' stroke prevention ability. Spearman's rank correlation analysis was performed on the total knowledge score and sociodemographic characteristics of the doctors, such as age, sex, and educational level. Statistical significance was set at $p < 0.05$.

Results

Questionnaire responses

In total, 450 questionnaires were issued before intensive training, 370 of which were returned, indicating a valid response rate of 82.2%. After the intensive training, 450 questionnaires were reissued, 389 of which were returned, indicating a valid response rate of 86.4%.

General information of respondents

In total, 370 and 389 community doctors were enrolled before and after intensive training, respectively. The general information (sex, age, educational level, professional title, specialty before engaging in community health services, general practitioner training status, training time, clinical experience time, and community service experience time) of the respondents before and after intensive training showed no significant difference between the two groups (Table 1).

Stroke management ability of community doctors before intensive training

The results of our study showed that only 7.0% (26/370) of the community doctors had knowledge of all the five warning symptoms of sudden stroke, and 34.9% (129/370) did not know any of the symptoms. Furthermore, only 3% (11/370) of the respondents correctly described the pre-hospital management of acute stroke. Although most doctors knew that thrombolysis is the most effective treatment for AIS, less than half [40.3% (149/370)] knew the thrombolytic time window. Only 20.8% (77/370) named four or more risk factors for stroke, and approximately 30% (108/370) were unable to name any. Less than 50% knew how to properly manage the risk factors for stroke, such as hypertension, diabetes, and atrial fibrillation.

Stroke management ability of community doctors after intensive training

After intensive training, 13.1% (51/389) of the community doctors correctly mentioned all five warning symptoms of stroke, while 20.3% (79/389) could not mention any; 28.0% (109/389) correctly described the pre-hospital management of acute stroke. The proportion of doctors who knew that the most effective treatment for AIS was thrombolytic therapy, along with the knowledge of its time window, increased to

55.0% (214/389). Regarding stroke prevention, 22.4% (87/389) named four or more major risk factors for stroke, while 13.9% (54/389) could not name any. The proportion of community doctors who knew how to properly manage the risk factors for stroke, such as hypertension, diabetes, and atrial fibrillation, was also significantly higher. The results showed that the stroke management ability of community doctors improved after intensive training ($p < 0.05$; Table 2).

Discussion

The most effective treatment for AIS, which accounts for 80% of all stroke events, is the relief of blood vessel stenoses to reduce the ischemic penumbra [9]. This is mainly achieved through intravenous thrombolysis, and the earlier it is performed, the greater the benefit to the patients [9]. A previous randomized controlled trial found that AIS patients who underwent intravenous thrombolysis with recombinant tissue plasminogen activator within 3 hours had complete or nearly complete recovery of neurological function at 3 months, which was significantly higher than that in the placebo group; the mortality rate at 3 months was similar between the two groups [10]. At the end of 2015, a series of randomized controlled trials [8, 11, 12] showed that, for patients with AIS of anterior vessels, intravascular treatment dominated by mechanical thrombectomy could provide clear benefits, and in 2015, domestic [13] and foreign guidelines [14] provided the highest level of recommendations for this treatment modality. Regarding the development to date, the DAWN and DEFUSE-3 trials [3, 4, 13] reported that the time window for intravascular treatment can be extended to 24 hours, and the 2018 AHA/ASA guidelines [5] and Chinese expert consensus [15] were revised again. The time window for the treatment of AIS is constantly being updated. AIS treatment involves pre-hospital stroke identification, evaluation, and treatment; secondary prevention, rehabilitation; and other procedures.

This is the first study to present results on intensive training of community doctors on stroke prevention and their management ability to devote to stroke treatment. The community doctor is the health advisor of the vast number of community residents. Only if the community doctor is familiar with the recognition, treatment, and referral of stroke can more stroke patients benefit. Previous surveys have reported that the stroke management ability of community doctors in China was low and required immediate improvement [6]. The results of our study showed that only 7.0% (26/370) of community doctors had knowledge of all five warning symptoms of sudden stroke, and 34.9% (129/370) did not know any of the symptoms. Only 3% (11/370) of the respondents correctly described the pre-hospital management of acute stroke, and less than half [40.3% (149/370)] knew the thrombolytic time window. Only 20.8% (77/370) named four or more risk factors for stroke. The results of our study indicated that community doctors in the Jinjiang district of Chengdu lacked the ability to manage the identification and pre-hospital treatment of stroke and the secondary prevention of stroke recurrence.

According to the guidelines [16, 17] for the prevention and treatment of cerebrovascular diseases in China, a series of stroke management training courses for community doctors was designed, including the management of major modifiable risk factors for stroke (hypertension, smoking, diabetes, carotid stenosis, atrial fibrillation, dyslipidemia, lack of physical exercise, unhealthy dietary

habits, alcohol consumption, drug abuse, and obesity). Our results showed that the stroke management ability of community doctors increased after intensive training. After the training, 13.1% (51/389) of the community doctors correctly cited all five warning symptoms of stroke, and 28.0% (109/389) correctly described the pre-hospital management of acute stroke. The proportion of doctors who knew that the most effective treatment for AIS was thrombolytic therapy, along with the knowledge of its time window, increased to 55.0% (214/389). Hence, this intensive training is helpful for the prevention, recognition, treatment, referral, and rehabilitation of stroke patients.

The shortcomings of this study are as follows: (1) the scope of the survey is limited to the Jinjiang District of Chengdu, the sample size was small, and the results do not reflect the overall situation of Chengdu; (2) compared with open-ended questions, the closed questions used in this survey may have resulted in a higher response rate in the evaluation of cognitive ability of stroke-related knowledge.

Conclusion

The stroke management ability of community doctors in the Jinjiang district of Chengdu requires improvement. Intensive stroke training of community doctors, involving primary and secondary prevention of stroke, acute treatment of stroke, neurological rehabilitation after stroke, and nursing of stroke patients, proved to be useful in improving their theoretical knowledge and clinical management of stroke. This may help in improving the diagnosis and treatment capacity of community health centers as well as in strengthening cooperation between these community centers and comprehensive stroke management centers, thereby achieving the goals of reducing the incidence and mortality of stroke. Therefore, intensive training is worth promoting.

Abbreviations

AIS: Acute ischemic stroke

MR-CLEAN: Multicenter randomized clinical trial of endovascular treatment for acute ischemic stroke in the Netherlands

TIA: Transient ischemic attack

Declarations

Ethics approval and consent to participate

Ethical approval for this study was obtained from the Medical and Health Research Ethics Committee of the Second People's Hospital of Chengdu, China. Written informed consent was obtained from all the participants. All methods were carried out in accordance with relevant guidelines and regulations.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare they have no competing interests.

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Authors' contributions

XMZ and YH were responsible for the study conception and design, data collection, first draft of the paper, and final manuscript. JW was responsible for the conception and design of the study and data analysis and interpretation. LYH was responsible for data collection. All authors read and approved the final manuscript for publication.

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Tables

Table 1. General information of respondents

	Before intensive training (n=370)	After intensive training (n=389)	<i>p</i> values
Sex (%)			0.622
Male	109 (29.5)	121 (31.1)	
Female	261 (70.5)	268 (68.9)	
Age (X ± S, y)	33.0 ± 9.6	34.2 ± 10.1	0.894
Education level			
Technical secondary school graduates and below	96 (25.9)	94 (24.2)	
Bachelor	216 (58.4)	228 (58.6)	
Masters or higher degree	58 (15.7)	67 (17.2)	
Job title			0.918
Resident	165 (44.6)	172 (44.2)	
Attending physician	162 (43.8)	168 (43.2)	
Deputy or chief physician	43 (11.6)	49 (12.6)	
Specialty before engaging in community health services			0.436
Internal medicine	228 (61.6)	241 (62.0)	
Surgery	31 (8.4)	42 (10.8)	
Others	111 (30.0)	106 (27.2)	
GP training	181 (48.9)	204 (52.4)	0.332
Training time (mo)	3-6	3-6	1.000
Clinical experience time (y)	2.5-15.5	3-15	1.000
Community experience time (y)	2-10	2-10	1.000

GP: general practitioner

Table 2. Effect of intensive training on the stroke management ability of community doctors

N (%)	Before intensive training (N=370)	After intensive training (N=389)	<i>p</i>
Prevention and treatment of cerebrovascular diseases			
Knowledge of relevant guidelines	140 (37.8)	265 (68.1)	<0.001
Classification of stroke	301 (81.4)	351 (90.2)	<0.001
Knowledge of stroke warning signs			<0.001
0	129 (34.9)	79 (20.3)	
1	62 (16.8)	91 (23.4)	
2	49 (13.2)	42 (10.8)	
3	63 (17.0)	51 (13.1)	
4	41 (11.1)	75 (19.3)	0.918
5	26 (7.0)	51 (13.1)	
Pre-hospital stroke assessment methods	9 (2.4)	109 (28.0)	
Management of acute ischemic stroke in community health centers (stations)			<0.001
0 score	289 (78.1)	201 (51.7)	<0.001
1 score	26 (7.0)	50 (12.9)	
2 score	21 (5.7)	41 (10.5)	
3 score	13 (3.5)	37 (9.5)	
4 score	10 (2.7)	28 (7.2)	
Score ≥ 5	11 (3.0)	32 (8.2)	
Thrombolytic therapy for acute ischemic stroke	329 (88.9)	351 (90.2)	0.554
Time window for thrombolytic therapy	149 (45.3)	214 (61.0)	<0.001
Risk factors for stroke			<0.001
0	108 (29.2)	54 (13.9)	
1	30 (8.1)	25 (6.4)	
2	44 (11.9)	28 (7.2)	
3	72 (19.5)	97 (24.9)	
4	77 (20.8)	87 (22.4)	

Score ≥ 5	39 (10.5)	98 (25.2)	
Definition of TIA	159 (43.0)	202 (51.9)	0.014
TIA management in community health centers	51 (13.8)	105 (27.0)	<0.001
General goal for target BP level for the prevention of recurrent stroke	247 (66.8)	289 (74.3)	0.023
Ideal goal for target BP level for the prevention of recurrent stroke	170 (45.9)	215 (55.3)	0.010
Goal for target HbA1c level for the prevention of recurrent stroke	152 (41.1)	239 (61.4)	<0.001
Goal for BP for the prevention of recurrent stroke in hypertensive patients with diabetes	152 (41.1)	239 (61.4)	<0.001
Awareness of statins therapy for the prevention of recurrent stroke	199 (53.8)	301 (77.4)	<0.001
General goals for LDL-c level for the prevention of recurrent stroke	28 (7.6)	107 (27.5)	<0.001
Side effects of statins			0.296
abnormal liver function	45 (12.2)	103 (26.5)	
muscle damage	30 (8.10)	89 (22.9)	
knowing both side effects	41 (11.1)	78 (20.1)	
Goals for LDL-c level for the prevention of recurrent stroke in patients associated with multiple risk factors or evidence for atherosclerotic vulnerable plaque or arterial embolism	31 (8.4)	95 (24.2)	<0.001
Awareness of warfarin therapy for the prevention of recurrent stroke in patients with atrial fibrillation	165 (44.6)	278 (71.5)	<0.001
Goal for INR level in patients who receive warfarin therapy	108 (65.5)	217 (78.1)	0.004
Awareness of antiplatelet therapy for the prevention of recurrent stroke	88 (23.8)	189 (48.6)	<0.001

TIA: transient ischemic attack; BP: blood pressure; LDL-C: low-density lipoprotein cholesterol; INR: international normalized ratio