Macrothink Institute™

Journal of Biology and Life Science
ISSN 2157-6076
2026, Vol. 17, No. 2

The Effect of Standardized Emergency Care Protocols on Door-to-Thrombolysis (DNT) Time in Patients with Acute Ischemic Stroke

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Received: March 18, 2026 Accepted: May 9, 2026 Published: May 19, 2026

doi:10.5296/jbls.v17i2.23773 URL: https://doi.org/10.5296/jbls.v17i2.23773

Abstract

To investigate the effect of standardized emergency care protocols on door-to-thrombolysis (DNT) time in patients with acute ischemic stroke, a total of 92 patients with acute ischemic stroke (AIS) who presented to the Department of Emergency at a Grade A Level III hospital (the top tier in mainland China) in Deyang City, Sichuan Province, between June 2024 and May 2025 were enrolled in this study. Patients were divided into a control group and an observation group based on the order of admission. The control group received conventional emergency nursing interventions, while the observation group received standardized emergency nursing protocols to compare the effects of the two nursing interventions on patient treatment time, neurological recovery, and post-thrombolysis complications. Results showed that in the observation group, DNT, time from admission to completion of thrombolysis assessment, time from admission to completion of the first CT scan, and total time spent on the emergency care pathway were all significantly shorter than those in the control group ($P < 0.05$); there was no significant difference in NIHSS scores between the two groups before thrombolysis ($P > 0.05$). However, NIHSS scores in the observation group were significantly lower than those in the control group 2 days and 7 days after thrombolysis ($P < 0.05$); the incidence of symptomatic intracranial hemorrhage, pulmonary infection, and deep vein thrombosis in the observation group was significantly lower than that in the control group ($P < 0.05$). In conclusion, a standardized emergency care pathway could effectively reduce treatment time for patients with acute ischemic stroke, promote neurological recovery, and lower the incidence of post-thrombolysis complications, paving ways for further studies in a wider and larger clinical settings.

Keywords: standardized emergency care pathway, acute ischemic stroke, intravenous thrombolysis, door-to-thrombolysis time (DNT), NIHSS score, post-thrombolysis complications

1. Introduction

Acute ischemic stroke (AIS) is an acute cerebrovascular disease characterized by the interruption of cerebral blood flow due to various causes, leading to ischemic and hypoxic necrosis of localized brain tissue and the rapid onset of corresponding neurological deficits (Madu & Ajibade, 2025). In recent years, influenced by factors such as an aging population and changes in lifestyle, the incidence of acute ischemic stroke has shown a rising trend year by year (Sadeq et al., 2022). Relevant studies (Li et al., 2024; Tan et al., 2024) indicate that East Asia is a high-incidence region for acute ischemic stroke, with an incidence rate of approximately 134.8 per 100,000 people. In contrast, incidence rates in developed Western countries are relatively lower, ranging from 100 to 140 per 100,000. While in China, the incidence rate of acute ischemic stroke reaches as high as 155.7 per 100,000. The high incidence rate and large patient population have made acute ischemic stroke the leading cause of death and disability among the Chinese population, placing a heavy burden on family care and the healthcare system.

Intravenous thrombolysis refers to the administration of thrombolytic drugs to activate the fibrinolytic system and degrade the fibrin in the thrombus, rapidly restore cerebral blood flow to the occluded vessel, salvage viable brain tissue in the ischemic penumbra, reduce the volume of the infarct, significantly mitigate neurological deficits, and lower the risk of disability and death caused by cerebral ischemia (Ayomide et al., 2025). However, time is of the essence in intravenous thrombolysis; the earlier the drug is administered, the higher the rate of recanalization, the lower the risk of hemorrhage, and the better the prognosis. For example, relevant guidelines (Berge et al., 2021) explicitly state that alteplase must be administered within 4.5 hours of symptom onset, while urokinase must be administered within 6 hours. Consequently, clinicians commonly use the time interval from the patient's arrival at the Emergency Department to the initiation of intravenous thrombolytic therapy (DNT time) to assess the efficiency of stroke emergency care. This undoubtedly places more detailed demands and challenges on emergency nursing interventions.

The Standardized Emergency Nursing Protocol (SENP) is a comprehensive, standardized, and procedural nursing model designed for critically ill patients, centered on emergency care processes and guided by a timeline. It serves as a vital tool for quality control and efficiency management in modern emergency nursing (Bai et al., 2025) and is currently widely applied in interventions for acute myocardial infarction (Yu et al., 2025), acute stroke (Wang et al., 2017), and pediatric emergency conditions (Deforest & Thompson, 2012). To further improve the efficiency of emergency care for patients with acute ischemic stroke and reduce their door-to-thrombolysis (DNT) time, this study applied the Standardized Emergency Nursing Protocol to clinical interventions for these patients to observe specific outcomes and hope to shed light on the efficacy of future research.

2. Research Methodology

2.1 General Information

This study is a prospective randomized controlled trial. Patients with acute ischemic stroke (AIS) who presented to the Emergency Department of a Grade A tertiary hospital in Deyang City, Sichuan Province, between June 2024 and May 2025 were enrolled as study subjects. Inclusion Criteria: (1) Patients meeting the diagnostic criteria outlined in the "Chinese Guidelines for the Diagnosis and Treatment of Acute Ischemic Stroke 2023" (Chinese Society of Neurology & Cerebrovascular Disease Group, Chinese Society of Neurology, Chinese Medical Association, 2024) and confirmed as having acute ischemic stroke via cranial CT or MRI; (2) Time from symptom onset to hospital admission ≤ 4.5 hours and meeting the indications for intravenous rt-PA thrombolysis; (3) Age ≥ 18 years; (4) First-time stroke or previous stroke without residual severe neurological deficits (mRS score ≤ 1); (5) Informed consent obtained from the patient's family and signed consent forms for thrombolysis and study participation; (6) Complete and un-missing records of key time points at admission, including NIHSS score, time from symptom onset to arrival, time from arrival to CT scan, time from arrival to laboratory results, and time from arrival to medication administration. Exclusion Criteria: (1) Patients with non-ischemic lesions such as intracerebral hemorrhage, subarachnoid hemorrhage, intracranial tumors, or traumatic brain injury as indicated by cranial CT; (2) Patients with contraindications to thrombolysis, such as coagulation disorders, active bleeding, a history of recent surgery or trauma, or a history of intracranial hemorrhage; (3) Patients with severe organ failure (e.g., cardiac, hepatic, renal, or pulmonary), malignant tumors, or severe infections; (4) Patients with missing clinical data, those who discontinued treatment, transferred to another hospital, or died; (5) Patients with cognitive impairment or psychiatric disorders who were unable to cooperate with emergency care or assessment. The 92 patients meeting the inclusion and exclusion criteria were then divided into a control group and an observation group based on the order of admission. Among the 46 patients in the control group (who received conventional nursing interventions), there were 25 males and 21 females; ages ranged from 45 to 86 years, with a mean of (66.25 ± 9.37) years; National Institutes of Health Stroke Scale (NIHSS) scores ranged from 6 to 18 points, with a mean of (13.12 ± 3.43) points; time from onset to admission (OTT) ranged from 1.0 to 4.5 hours, with a mean of (2.58 ± 0.92) hours. Among them, 34 patients had hypertension, 27 had diabetes, and 32 had hyperlipidemia. In the observation group of 46 patients (who received standardized emergency care pathway interventions), there were 28 males and 18 females; ages ranged from 45 to 84 years, with a mean of (65.89 ± 8.96) years; NIHSS scores ranged from 5 to 19 points, with a mean of (13.36 ± 3.21) points; OTT time ranged from 1.3 to 4.2 hours, with a mean of (2.61 ± 0.87) hours; 26 patients had concomitant hypertension, 34 had diabetes, and 28 had hyperlipidemia. There were no statistically significant differences ($P > 0.05$) between the two groups in terms of general characteristics such as gender, age, NIHSS score, OTT time, and underlying conditions, indicating that the groups were comparable.

2.2 Methods

2.2.1 The control group received conventional emergency nursing interventions

(1) Prehospital emergency phase

Upon receiving an emergency dispatch, medical personnel rush to the scene to routinely assess the patient's level of consciousness, pupil response, vital signs, and neurological deficits, while verbally inquiring with family members about the time of onset and medical history. A peripheral intravenous line is rapidly established, and oxygen therapy and ECG monitoring are initiated. If necessary, the airway is cleared and symptomatic treatment is administered. Vital signs are continuously monitored during transport, and key indicators are recorded.

(2) Emergency Department Admission Phase

Upon arrival in the Emergency Department, the triage nurse assigns a treatment priority, assists the physician with the physical examination, and based on medical orders, orders laboratory tests (e.g., complete blood count, coagulation studies) and imaging studies (e.g., head CT). The nurse also assists the patient in completing all necessary tests and examinations.

(3) Examination and Diagnosis Phase

A designated staff member accompanies the patient to the Examination Department. Upon receipt of the results, the physician comprehensively evaluates the reports to determine eligibility for thrombolysis. For eligible patients, the physician informs the family of the risks and benefits of thrombolysis and obtains a signed informed consent form.

(4) Thrombolysis Treatment Phase

Thrombolytic agents are prepared and administered strictly according to medical orders. Vital signs and changes in neurological function are monitored during infusion, and records are maintained as needed. Since there is no standardized protocol for observing adverse reactions or managing complications, in the event of adverse reactions such as allergic reactions or bleeding, the physician must be notified immediately for intervention.

(5) Post-thrombolysis Monitoring Phase

After thrombolysis, the patient is assisted in transferring to the neurology ward and ensure a thorough handover of the patient's condition, including vital signs, level of consciousness, and pupil status.

2.2.2 Implementation of Standardized Care Protocol (SCP) Interventions in the Observation Group

(1) Triage and Rapid Identification (to be completed within 5 minutes of arrival) Triage nurses use the FAST scale (Face drooping, Arm weakness, Speech impairment, Time to call for help) combined with the Face-Arm-Leg-Speech test (FAST-PLUS) for rapid screening. Immediately place a red stroke bracelet on suspected stroke patients and activate the stroke

green channel. The triage nurse directly notifies the stroke team (including emergency physicians, neurologists, nurses, and radiology technicians), while simultaneously recording the patient's exact time of arrival (to the minute) and entering it into the electronic medical record system.

(2) Initial Assessment and Multidisciplinary Simultaneous Response (Target: Completed within 10 minutes of arrival)

Stroke team physicians (emergency medicine + neurology) arrive at the triage area within 5 minutes to simultaneously complete the patient's medical history (focusing on time of onset and last normal activity), vital signs monitoring (blood pressure controlled at ≤185/110 mmHg), NIHSS scoring (using a portable scoring sheet, completed within 5 minutes), and GCS scoring. Nurse A is responsible for establishing an IV line (using an 18G indwelling catheter) and drawing blood samples, while Nurse B contacts the CT department to prioritize the scan. The neurologist simultaneously contacts the family by phone.

(3) "Zero-Wait" Diagnostic and Laboratory Testing Process (Goal: Complete CT scan within 25 minutes of arrival; obtain report within 35 minutes)

The patient is transported to the CT suite within 10 minutes of arrival; technicians preheat the equipment in advance; upon completion of the scan, the neurologist reviews the images in real time; the CT report is issued within 15 minutes. The blood sample drawn by Nurse A is labeled "Stroke Priority" and sent directly to the laboratory, which activates the stroke green channel (complete blood count in 10 minutes, coagulation panel in 15 minutes, blood glucose in 5 minutes); results are automatically synchronized to the electronic medical record system.

(4) Standardized Communication with Family Members (Goal: Complete informed consent within 30 minutes of arrival)

Utilize structured communication templates and short educational videos (a 3-minute animated demonstration of the thrombolysis process, bleeding risks, and response measures). Communication is led by a trained stroke specialist nurse, who lists the absolute and relative contraindications for intravenous thrombolysis. While the family discusses, the nurse simultaneously prepares the thrombolytic medication to avoid delays caused by waiting for a decision.

(5) "Pre-packaging + Dual Verification" Mechanism for Thrombolytic Agents (Goal: Complete drug preparation within 40 minutes of arrival)

The pharmacy pre-packs medications according to the "Stroke Emergency Kit" (including alteplase 50 mg/vial, divided into a 10% loading dose and a 90% maintenance dose), stores them in a dedicated drawer on the emergency resuscitation cart, and labels them "For Stroke Use Only"; Upon receiving a physician's order, Nurse C directly retrieves the pre-packaged medication (no need for on-site collection). During preparation, the "two-person, two-signature" system is implemented, with verification including: patient name, admission number, drug dosage, expiration date, allergy history, and bleeding history. The "Stroke Thrombolysis Checklist" is used for documentation.

(6) Closed-loop management of medication administration and timing (Target: DNT ≤ 60 minutes)

Intravenous thrombolysis should be initiated immediately after the CT report rules out intracerebral hemorrhage, laboratory results show no absolute contraindications, and the family has signed the consent form. Nurse D uses a "DNT timer" (digital stopwatch) to record the time from the patient's arrival at the hospital to the start of thrombolytic infusion, accurate to the minute, and enters this data into the electronic medical record system. Meanwhile, the quality control nurse reviews this data promptly.

(7) Post-Administration Monitoring and Transfer (Goal: Continuous dynamic assessment to reduce complications)

Monitoring frequency: Monitor the NIHSS score and vital signs every 15 minutes from 0 to 30 minutes post-administration; every 30 minutes from 30 to 120 minutes; and hourly thereafter until 24 hours. Once the patient's vital signs are stable, a designated staff member will transfer the patient to the neurology ward and complete a written handover.

2.3 Monitoring Indicators

2.3.1 Treatment Time

The DNT time, time from admission to completion of the thrombolysis assessment, time from admission to completion of the first CT scan, and total time required for the emergency nursing process were recorded for both groups. Shorter times in each group indicate more effective nursing interventions.

2.3.2 Neurological Deficit

The National Institutes of Health Stroke Scale (NIHSS) (Cheng et al., 2023) was used to evaluate patients in both groups before thrombolysis, 2 days after thrombolysis, and 7 days after thrombolysis. This scale is a globally recognized tool for assessing neurological deficits in acute stroke, with a Cronbach's α of 0.796. It consists of 13 items and a total score ranging from 0 to 42; a higher score indicates more severe neurological deficits in the patient.

2.3.3 Incidence of Post-Thrombolysis Complications

The incidence of symptomatic intracranial hemorrhage, pulmonary infection, and deep vein thrombosis was recorded for both groups. A lower incidence of these complications indicates that the nursing interventions are more effective.

2.4 Statistical Methods

Data were processed and analyzed using SPSS 26.0 statistical software. Continuous variables: age, NIHSS score, OTT time, DNT time, time from admission to completion of thrombolysis assessment, time from admission to completion of the first CT scan, and total duration of emergency nursing procedures. Variables with a normal distribution were expressed as mean ($\bar{x} \pm s$) ± standard deviation (SD). Intergroup comparisons were performed using the independent samples t-test. Variables with a non-normal distribution were expressed as

median (interquartile range) [M (P25, P75)], and intergroup comparisons were performed using the Mann-Whitney U test. Categorical data, including gender, history of hypertension, diabetes, and hyperlipidemia, as well as the incidence of post-thrombolysis complications such as symptomatic intracranial hemorrhage, systemic bleeding, pulmonary infection, and deep vein thrombosis, were expressed as the number of cases (percentage) [n (%)], and intergroup comparisons were performed using the chi-square test or Fisher's exact test (when the expected frequency < 5). The significance level was set at $\alpha = 0.05$; $P < 0.05$ was considered statistically significant.

3. Results

When comparing treatment times between the two groups, the observation group had significantly shorter DNT times, shorter times from admission to completion of thrombolysis assessment, shorter times from admission to completion of the first CT scan, and shorter total times for the emergency care process than the control group ($P < 0.05$), as shown in Table 1.

Table 1. Comparison of Treatment Times Between the Two Groups ($\bar{x} \pm s$) Unit: Minutes

Group	Number of Cases	DNT Time	Time from Admission to Completion of Thrombolysis Assessment	Time from Admission to Completion of First CT Scan	Total Time for Emergency Care Process
Control group	46	74.38±5.32	53.24±5.26	30.31±4.25	124.89±10.98
Observation group	46	46.73±3.26	32.76±1.87	18.69±2.63	98.64±8.52
t		30.056	24.882	15.769	12.810
P		0.000	0.000	0.000	0.000

A comparison of NIHSS scores between the two groups before thrombolysis, 2 days after thrombolysis, and 7 days after thrombolysis revealed no significant difference in NIHSS scores between the two groups before thrombolysis ($P > 0.05$). However, 2 days and 7 days after thrombolysis, the NIHSS scores in the observation group became significantly lower than those in the control group ($P < 0.05$). See Table 2.

Table 2. Comparison of NIHSS Scores Before and After Thrombolysis in the Two Groups ($\bar{x} \pm s$) Unit: Points

Group	Number of Cases	NIHSS score before thrombolysis	NIHSS score 2 days after thrombolysis	NIHSS score 7 days after thrombolysis
Control group	46	13.12±3.43	10.56±2.62	6.87±1.75
Observation group	46	13.36±3.21	8.12±0.96	4.23±0.82
t		0.346	5.931	9.265
P		0.730	0.000	0.000

A comparison of the incidence of post-thrombolysis complications between the two groups revealed that the incidence of symptomatic intracranial hemorrhage, pulmonary infection, and deep vein thrombosis was significantly lower in the observation group than in the control group ($P < 0.05$), as shown in Table 3.

Table 3. Comparison of the Incidence of Post-thrombolysis Complications Between the Two Groups [n, (%)]

Group	Number of Cases	Symptomatic intracranial hemorrhage	Pulmonary infection	Deep vein thrombosis	Incidence of complications
Control group	46	1(2.17)	5(10.87)	3(6.52)	9(19.56)
Observation group	46	0(0.00)	1(2.17)	1(2.17)	3(4.34)
χ^2		-	-	-	5.059
P		-	-	-	0.024

4. Discussion

4.1 Standardized Emergency Care Pathways Could Effectively Reduce Treatment Time for Patients with Acute Ischemic Stroke

Acute ischemic stroke is characterized by the principle that "time is brain." Following an acute ischemic stroke, approximately 1.9 million neurons die irreversibly every minute due to cerebral ischemia and hypoxia. Intravenous thrombolysis within 4.5 hours of onset is the core measure for improving cerebral perfusion and reducing disability and mortality, while door-to-thrombolysis (DNT) time is a key indicator of in-hospital thrombolysis efficiency (Chen et al., 2024). Traditional emergency care models suffer from fragmented processes, unclear responsibilities, and poor coordination, which may lead to delayed assessments, waiting times for tests, and delayed consultations, causing the DNT to exceed the guideline-recommended threshold of 60 minutes (Duan, 2023). Standardized emergency care pathways, grounded in evidence-based practice, break down stroke emergency care into fixed stages such as rapid triage, neurological assessment, activation of the green channel, CT scanning, laboratory testing, thrombolysis assessment, and medication preparation. By defining operational standards and time limits for each role, these pathways enable a closed-loop management system where assessment begins upon admission, testing follows immediately, and decisions are made promptly. This effectively eliminates decision-making hesitation and procedural redundancies, significantly reducing the total time from admission to thrombolysis assessment, ensuring more patients receive standardized thrombolysis within the therapeutic window, and improving treatment outcomes (Hu & Lv, 2023). This study confirms that the implementation of a standardized emergency nursing pathway could significantly shorten critical treatment times for patients with acute ischemic stroke. In the observation group, the time from onset to treatment (DNT), time from admission to completion of thrombolytic assessment, time from admission to completion of the first CT scan, and total duration of the emergency nursing process were all significantly shorter than those in the control group ($P < 0.05$). These findings are consistent with numerous domestic and international studies (Zi et al., 2023; Madhok et al., 2019), highlighting the core value of structured processes in emergency care. The primary reason lies in the standardized pathway management implemented in the observation group, whose core mechanism involves an integrated model of pre-hospital alerting—in-hospital preparation—and priority examination. Pre-hospital emergency personnel transmit patient information in advance, while the

in-hospital radiology and Emergency Departments stand by simultaneously, Upon admission, patients bypassed routine triage and payment procedures and were escorted directly to the CT suite by dedicated staff, avoiding queues. Additionally, a time limit was established for the issuance of CT reports to ensure rapid feedback of imaging results to the thrombolysis team. This model transformed traditional sequential waiting into parallel processing, fundamentally reducing wait times for examinations, transport, and report delays, thereby securing a valuable window of opportunity for subsequent thrombolysis assessment. Furthermore, this nursing pathway covers the entire process from admission to thrombolytic administration. By standardizing operating procedures, formalizing communication protocols, and strengthening multidisciplinary collaboration, it resolves inefficiencies in traditional emergency care—such as redundant procedures, communication gaps, and disjointed transitions. Nursing staff simultaneously complete vital sign monitoring, intravenous access establishment, blood sample collection, and precise medical history documentation according to the pathway, thereby avoiding time losses caused by disorganized procedures. Furthermore, by using specific time points as quality control benchmarks, the pathway enables real-time tracking of progress at each stage, allowing for the timely identification and resolution of process bottlenecks. This compression of the overall process time not only enhances the operational efficiency of emergency care but also reduces the risk of patient delays in the Emergency Department, laying the foundation for subsequent specialized treatment and rehabilitation management. Consequently, patients in the observation group, who followed the standardized emergency care pathway, had significantly shorter DNT times, shorter times from admission to completion of thrombolysis assessment, shorter times from admission to completion of the first CT scan, and shorter total emergency care process durations compared to patients in the control group.

4.2 Standardized Emergency Care Pathways Could Effectively Improve Neurological Deficits in Patients with Acute Ischemic Stroke

The severity of neurological deficits in acute ischemic stroke (AIS) is directly correlated with patient prognosis. The National Institutes of Health Stroke Scale (NIHSS) score, as the golden standard for assessing neurological deficits, provides a clear reflection of the progression of reversible and irreversible damage following cerebral ischemia and hypoxia (Khan et al., 2022). The results of this study show that patients who received standardized emergency care pathway interventions had significantly lower NIHSS scores at 2 days and 7 days post-thrombolysis compared to the control group ($P < 0.05$), suggesting that the standardized pathway could effectively reduce neurological deficits in the acute phase. This is primarily because the standardized pathway interrupts the ischemic cascade by shortening the door-to-thrombolysis (DNT) time, thereby reducing irreversible neuronal necrosis and preserving more neurological reserve. Additionally, the standardized pathway optimizes precise, multi-step coordinated interventions, ensuring the timeliness and accuracy of critical therapeutic measures such as blood pressure regulation, blood glucose management, and the use of antiplatelet or anticoagulant medications, which collectively mitigate neurological damage. Consequently, the NIHSS scores of patients in the observation group were significantly lower than those in the control group at 2 days and 7 days post-thrombolysis,

effectively improving patients' neurological deficits. This is also consistent with the findings of Zhan & Xu (2025).

4.3 Standardized Emergency Care Protocols Could Effectively Reduce Post-Thrombolysis Complications in Patients with Acute Ischemic Stroke

In patients with acute ischemic stroke (AIS) who undergo intravenous thrombolysis, symptomatic intracranial hemorrhage, pulmonary infection, and deep vein thrombosis are major complications that threaten prognosis. Their occurrence is closely related to the extent of ischemic injury, the timing of reperfusion, the standardization of thrombolysis management, and the patient's baseline condition. This study shows that the incidence of post-thrombolysis complications in the standardized emergency care pathway group (4.34%) was significantly lower than that in the conventional care group (19.56%) ($P < 0.05$), suggesting that the standardized emergency care pathway could effectively reduce the risk of post-thrombolysis complications through systematic optimization of intervention processes. The primary reason lies in the standardized emergency care pathway's establishment of a comprehensive standardized system covering pre-hospital assessment, emergency triage, thrombolysis preparation, and drug administration monitoring, which strictly regulates the rapid screening process for thrombolysis indications and contraindications, precisely calculates thrombolytic drug doses based on body weight and standardizes infusion rates, simultaneously establishes dynamic blood pressure control targets and real-time NIHSS neurological function monitoring protocols, and enables early identification of hemorrhage warning signs, such as headache, vomiting, altered consciousness, and sudden deterioration of neurological function, to immediately initiate emergency interventions. By blocking the triggers for hemorrhagic transformation across multiple stages, including medication management, vital sign monitoring, and the identification of abnormal signals, the protocol effectively reduces the risk of symptomatic intracranial hemorrhage. Furthermore, early improvement in patients' neurological function enables them to begin rehabilitation activities sooner, thereby effectively reducing the duration of prolonged bed rest and lowering the incidence of pulmonary infections and deep vein thrombosis. Consequently, the incidence of post-thrombolysis complications in the observation group was significantly lower than that in the control group.

5. Summary and Outlook

This study focuses on the core principle of "time is brain" in the emergency treatment of acute ischemic stroke (AIS). By comparing the impact of a standardized emergency care pathway on treatment times versus a conventional care model, the study demonstrates that the standardized pathway could significantly reduce door-to-thrombolysis (DNT) time, time from admission to completion of thrombolysis assessment, time from admission to completion of the first CT scan, and the total duration of the emergency care process. This could effectively reduce neuronal necrosis, mitigate reperfusion injury, and significantly improve neurological function in acute stroke patients, while simultaneously lowering the risk of post-thrombolysis complications. These findings validate the core value of standardized emergency care pathways in AIS treatment and provide scientific support for the efficient management of acute ischemic stroke patients.

Although this study confirmed the short-term benefits of the standardized emergency care pathway, certain potential limitations still exist, such as a relatively small sample size and an observation period limited to 7 days post-thrombolysis, the long-term neurological recovery and the pathway's impact on the risk of recurrence remain unclear, and the cost-effectiveness of implementing the pathway has not been thoroughly analyzed. Upcoming future studies will expand the sample size and conduct multicenter validation, extend the observation period to 3–6 months, analyze the pathway's impact on long-term patient outcomes such as activities of daily living and stroke recurrence rates, and quantify the economic value of this nursing pathway in reducing complications and shortening hospital stays, thereby providing a solid basis for the formulation of medical insurance reimbursement policies which could benefit vast common patients in China.

Acknowledgments

Not applicable.

Author contributions

Not applicable.

Funding

Not applicable.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Macrothink Institute.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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