ORIGINAL RESEARCH

Enhancing the Efficacy of Emergency Care Pathways in the Management of Stroke Patients

Yujuan Han, MBBS, Maling Xiang, MBBS, Lingling Wang, MBBS, Ningning Dai, MBBS

ABSTRACT

Background • The rising incidence of emergency stroke cases emphasizes the need for refining care strategies. This study addresses this critical need to assess the effectiveness of optimized emergency care pathways for improving patient outcomes.

Objective • This study evaluates the efficacy of optimized emergency care pathways for stroke patients in emergency situations.

Methods • A total of 60 emergency stroke cases admitted to our hospital between June 2020 and June 2022 were included. Patients were assigned to a control group and an observation group based on care modalities in a 1:1 ratio. The control group received conventional emergency care, while the observation group underwent the optimized emergency care pathway. Baseline data, resuscitation effects, clinical outcomes, serum inflammatory factor levels, prognosis, nursing satisfaction, and related indices were recorded and compared between the two groups.

Results • Patients in the observation group exhibited significantly reduced resuscitation and treatment times compared to the control group ($P < .001$). The observation group had fewer deaths within 48 hours ($P < .001$). Serum levels of interleukin (IL)-6, IL-8, and Intercellular Adhesion Molecule-1 (ICAM-1) decreased significantly in the observation group compared to the control group ($P < .001$). The observation group also had fewer cases of disability, vegetation, and death (6.66% vs. 40%, $P < .001$). Patient satisfaction in the observation group was 90%, significantly higher than the control group (20%, $P < .001$).

Conclusions • The optimized emergency care pathway proves effective for emergency stroke patients, enhancing resuscitation, clinical outcomes, and prognosis while reducing inflammatory factors. Furthermore, it elevates patient satisfaction, warranting widespread implementation. (*Altern Ther Health Med.* 2024;30(12):159-163).

Yujuan Han, MBBS, Lingling Wang, MBBS, Department of Emergency Medicine, the First Affiliated Hospital of Soochow University, Institute of Trauma Medicine, Soochow University, Jiangsu Provincial Medical Innovation Center of Trauma Medicine, Suzhou, China. **Maling Xiang, MBBS, Ningning Dai, MBBS,** Department of Emergency Medicine, The Fourth Affiliated Hospital of Soochow University, Suzhou Dushu Lake Hospital, Medical Center of Soochow University, Suzhou, China.

Corresponding author: Lingling Wang, MBBS
E-mail: 243198649@qq.com
Corresponding author: Ningning Dai, MBBS
E-mail: 448451556@qq.com

INTRODUCTION

Stroke, also called a cerebrovascular accident, represents a critical acute vascular condition resulting from the sudden rupture or blockage of blood vessels in the brain. It leads to compromised blood flow, causing damage to brain tissue and causing higher morbidity and mortality rates among patients.[1-3] The elderly population is particularly vulnerable, increasing the risk to health and life. Urgent resuscitation and treatment become imperative in mitigating the detrimental effects of stroke, emphasizing the critical need for effective interventions.[4,5]

Conventional emergency care models offer initial aid and symptom management for patients, but they exhibit reduced effectiveness in resuscitating those experiencing acute strokes.[6,7] In contemporary clinical practice, the optimized emergency care pathway has emerged as a more widely employed model for managing stroke patients. It is a prospective care model focusing on developing targeted, rational, and efficient care plans under medical guidance. This approach aims to minimize the time for patient transfer and consultation, optimize emergency procedures, improve the success rate of resuscitation and clinical outcomes, and make maximum efforts to save patients' lives.[8,9]

While recognizing the acknowledged shortcomings of current emergency care models, a critical gap exists in understanding the full potential and effectiveness of optimized emergency care pathways in treating acute stroke patients. The limitations of conventional models and the need for swift and effective interventions emphasize the necessity for comprehensive and tailored emergency care strategies.

This study explored the influence and extent of optimized emergency care pathways on the clinical outcomes of patients, considering factors such as disability, vegetation, and mortality in acute stroke cases. The objective is to thoroughly investigate and analyze the effects of optimized emergency care pathways on these specific parameters in stroke patients.

MATERIALS AND METHODS

Study Design and Participants

This study included 60 cases of emergency stroke patients admitted to our hospital between June 2020 and June 2022. Eligibility criteria were applied, and baseline data, encompassing gender, age, BMI, GCS score, and onset type, were carefully collected. Subsequently, patients were evenly distributed in a 1:1 ratio into a control group and an observation group based on different care modalities. The baseline parameters of patients in both groups were comparable, ensuring homogeneity. All participants provided written informed consent.

Inclusion and Exclusion Criteria

Patients considered for inclusion in this study having (1) a clinical diagnosis of acute stroke; (2) an onset time within 12 hours; (3) a Glasgow Coma Scale (GCS) score ranging between 3 and 13; (4) confirmation of the cerebrovascular diagnosis was required through either CT or MRI examination. Exclusion criteria included patients: (1) who were transferred to the hospital; (2) individuals who had undergone relevant thrombolysis or embolization procedures; (3) those experiencing severe dysfunction in the liver or other organs; and (4) participants with coagulation dysfunction.

Treatment Procedures in the Control Group

In the control group, patients received resuscitation, treatment, and care through the conventional emergency care model. This approach primarily involved monitoring vital signs, establishing intravenous access, and administering pain relief, sedation, and other necessary treatments. Following the determination of the treatment plan, patients underwent surgery or were transferred to relevant wards for further treatment.

Treatment Approach in the Observation Group

In the observation group, patients underwent treatment via the optimized emergency care pathway, implemented as follows:

Establishment of an Emergency Department Nursing Team. A specialized team comprising the director of the emergency department, the head nurse, and the charge nurse was formed to oversee emergency care. The clinical data of previous emergency stroke patients were thoroughly analyzed and studied. Relevant nursing pathways, encompassing pre-diagnosis, consultation, emergency measures, and surgical preparation, were carefully summarized. A crucial aspect of the pathway required the decision on treatment to be made within 30 minutes of patient admission.

Training of Emergency Department Nursing Team. As part of the optimized emergency care pathway, the nursing team members in the emergency department underwent comprehensive training. Job responsibilities and the division of labor among team members were clearly defined to ensure a streamlined workflow. Nursing behavior was standardized to maintain consistency and adherence to established protocols. To enhance preparedness and efficiency, the team participated in periodic simulations, ensuring optimal response in emergency situations.

Patient Reception and Immediate Care Protocols. In the optimized emergency care pathway, the nursing team follows careful procedures: (1) preparation before patient arrival: team members ensure thorough preparation, including having necessary emergency items, before receiving the patient; (2) efficient patient reception: upon patient arrival, the team opens a dedicated green channel, following a structured sequence of resuscitation, examination, medication, and subsequent payment and hospitalization; (3) rapid assessment and intervention: within the first 10 minutes, the team carefully observes and records vital signs, conducts a precise assessment of the patient's condition, and responds promptly. Interventions, such as airway opening, oxygen supply, and intravenous access, were tailored to the patient's symptoms.

Coordinated medical procedures. the team collaborates with physicians to carry out cardiac monitoring, laboratory tests, and necessary examinations, ensuring timely acquisition and transmission of relevant results; (5) swift decision-making: within 30 minutes, a treatment decision was reached. For patients requiring surgery, preoperative preparations were initiated, and timely transfer to the operating room was facilitated.

Outcomes Assessment

Resuscitation and Clinical Outcomes. The study compared the resuscitation effects between the two groups of patients under different care modes. It primarily involved the assessment of resuscitation time, treatment reception time, and the number of deaths within 48 hours.

Inflammatory Factors in Serum: Post-Operative Care. For both patient groups, 3ml of early morning fasting venous blood was collected 24 hours after surgery and before discharge. Subsequently, the blood samples were centrifuged at 3000 r/min for 10 min. The serum levels of interleukin-6 (IL-6), IL-8, and intercellular adhesion molecule-1 (ICAM-1) were measured using enzyme-linked immunosorbent assay (ELISA).

Patient Prognosis Comparison. The study compared patient prognoses and the incidence of prognosis between the two care modes. It included disability, death, and vegetative outcomes. The prognostic incidence was calculated using the formula: Prognostic Incidence = (Disability + Death + Vegetative /Total Number) ×100%

Nursing Satisfaction Assessment. A custom questionnaire was employed to evaluate nursing satisfaction. The assessment categories included: "very satisfied," "generally satisfied," and "unsatisfied." The overall satisfaction was calculated using the formula: Satisfaction = Very Satisfied Rate + General Satisfaction Rate

Statistical Analysis

Statistical analyses were conducted using IBM SPSS Statistics 24.0 (International Business Machines, Corp., Armonk, NY, USA) and Stata 16 Stata 16 (StataCorp LP, College Station, TX, USA). Descriptive statistics for numerical variables included means, medians, standard deviations, and ranges. Categorical variables were described using frequencies [n (%)], and between-group differences were assessed using chi-square tests (χ^2). The normality of continuous variables was examined through the Kolmogorov–Smirnov test. Between-group comparisons for normally distributed variables employed *t* tests, while non-normally distributed variables were assessed using the Mann–Whitney *U* test. The significance level, denoted as *P*, was set at .05 (two-sided).

RESULTS

Comparison of Baseline Characteristics between Two Groups

The control group comprised 30 patients, 17 males and 13 females, aged between 30 and 59 years (mean age 44.13±3.25 years). Their BMI ranged from 21 to 30 kg/m², with a mean of 25.43±2.25 kg/m². The GCS score varied from 3 to 12, with a mean of 6.12±2.11 years. The onset types included 11 cases of ischemic stroke and 19 cases of hemorrhagic stroke.

In comparison, the observation group consisted of 30 patients, including 18 males and 12 females, with ages ranging from 31 to 60 years (mean age 45.83±3.14 years). The BMI ranged from 20 to 29 kg/m², with a mean of 24.69±3.01 kg/m². GCS scores varied from 4 to 13, with a mean of 6.51±2.35 years. Onset types included 9 cases of ischemic stroke and 21 cases of hemorrhagic stroke. The distribution of baseline characteristics was well-balanced between the two groups ($P > .05$). Refer to Table 1 for details.

Clinical Outcomes Comparison between Control and Observation Groups

The resuscitation time and treatment duration for patients in both groups significantly reduced, with the observation group demonstrating lower times than the control group ($P < .001$). Moreover, the observation group exhibited fewer cases of death and a lower total death count within 48 hours compared to the control group ($P < .001$). Refer to Table 2 for detailed statistics.

Results of Inflammatory Factors Analysis

The serum levels of IL-6, IL-8, and ICAM-1 in the observation group patients showed a significant decrease compared to both groups, with the observation group exhibiting lower levels than the control group ($P < .001$). Please refer to Table 3 for detailed results.

Results of Prognosis Analysis

The observation group demonstrated a lower incidence of disability, vegetation, and death compared to the control group (6.66% vs. 40%, $P < .001$). Refer to Table 4.

Table 1. Comparison of Baseline Characteristics between Two Groups

Variables	Control Group	Observation Group
n	30	30
Gender		
Male	17	18
Female	13	12
Age (years)	30-59	31-60
Average	44.13±3.25	45.83±3.14
BMI (kg/m²)	21-30	20-29
Average	25.43±2.25	24.69±3.01
GCS	3-12	4-13
Average	6.12±2.11	6.51±2.35
Disease Type		
Ischemic Stroke	11	9
Hemorrhagic Stroke	19	21

Abbreviations: GCS, Glasgow Coma Scale; BMI, Body Mass Index.

Table 2. Comparison of the Resuscitation Effect and Clinical Outcome ($\bar{x} \pm s$)

Groups	n	Resuscitation Time (H)	Treatment Time (H)	Number Of Deaths Within 48h [n(%)]	Total Number of Deaths [n(%)]
Control Group	30	22.31±2.49	35.47±1.56	7 (23.33)	9 (30.00)
Observation Group	30	15.11±1.63	29.83±1.24	2 (6.66)	1 (3.33)
t		13.251	15.501	11.032	23.954
P value		*P* < .001	*P* < .001	*P* < .001	*P* < .001

Note: Resuscitation Time and Treatment Time are presented as mean ± standard deviation ($\bar{x} \pm s$).

Table 3. Comparison of Serum Levels Of Inflammatory Factors ($\bar{x} \pm s$)

Groups	n	IL-6	IL-8	ICAM-1
Control Group	30	76.54±14.49	76.47±8.21	17.72±2.16
Observation Group	30	58.11±7.63	59.83±5.24	13.53±1.37
t		6.164	9.357	8.972
P value		*P* < .001	*P* < .001	*P* < .001

Note: IL-6, IL-8, and ICAM-1 levels are presented as mean ± standard deviation ($\bar{x} \pm s$).

Abbreviations:IL-6: Interleukin-6; IL-8: Interleukin-8; ICAM-1: Intercellular Adhesion Molecule-1

Table 4. Comparison of Patient Prognosis [n(%)]

Groups	n	Disability	Vegetation	Death	Incidence
Control Group	30	5	4	3	12 (40.00)
Observation Group	30	1	1	0	2 (6.66)
χ^2					30.287
P value					*P* < .001

Note: Disability, vegetation, and death are presented as counts. Incidence is presented as a percentage.

Table 5. Patient Satisfaction Comparison [n(%)]

Groups	n	Very Satisfied	Satisfied	Unsatisfied	Satisfaction Rate
Control Group	30	11	9	10	20 (66.66)
Observation Group	30	21	7	2	28 (93.33)
χ^2					23.202
P value					*P* <0.001

Note: Very satisfied, satisfied, and unsatisfied are presented as counts. Satisfaction rate is presented as a percentage.

Patient Care Satisfaction Comparison

Following the administration of distinct care modes to both patient groups, the observation group exhibited a significantly higher level of patient satisfaction at 90%, in contrast to the control group's satisfaction rate of 20% ($P < .001$). Refer to Table 5 for detailed results.

DISCUSSION

Acute stroke, characterized by neurological deficits resulting from compromised local blood circulation in the human brain, [10,11] manifests with prominent clinical symptoms, including slurred speech, impaired consciousness, incontinence, dizziness, vomiting, and, in severe cases, epilepsy. It can potentially lead to fatal outcomes due to the brain's limited tolerance for hypoxia, typically only lasting 3-5 minutes, and the swift and unpredictable onset of stroke.[12,13]

Considering the absence of identified effective drugs for stroke treatment, the pivotal approach to enhancing patient prognosis lies in the timely control of blood pressure levels and prompt intervention after onset. Therefore, there is an urgent need to employ resuscitation care measures that are both timely and effective for stroke patients.

Conventional emergency care, proven to be inefficient, time-consuming, and clinically ineffective for stroke patients, often results in a bleak prognosis.[14,15] In contrast, the optimized emergency care pathway represents a novel, patient-centered care model designed explicitly for stroke cases. This innovative approach enables swift, efficient, and cohesive emergency care and treatment, aiming to achieve effective rescue and significantly improve resuscitation outcomes.[16,17]

Several studies highlight the growing prevalence of optimized emergency care pathways in clinical settings, with widespread acknowledgement within medical circles for superior resuscitation and clinical outcomes. In a related study, Liu et al.[16] further demonstrated that this model effectively shortens resuscitation time and enhances overall resuscitation outcomes. Our study consistently demonstrated noteworthy findings, showing a substantial reduction in resuscitation and treatment times for patients within the observation group compared to the study group. Moreover, the observation group exhibited lower incidences of disability, vegetation, and death compared to the control group.

Our findings underscore that the standardized and procedural attributes of the optimized emergency pathway empower each medical and nursing staff member to delineate their responsibilities before, during, and after emergencies, enabling them to fully leverage their roles. Simultaneously, this approach enhances the clinical treatment experience and fosters the improvement of nursing skills and concepts among medical and nursing staff.[18-20]

Furthermore, the current study revealed a significant decrease in serum levels of inflammatory factors among all patients utilizing the optimized emergency care pathway, aligning with the findings of Li et al.[17] This scientifically designed and standardized emergency care model, characterized by an efficient process and rapid treatment initiation within 30 minutes, minimizes patient distress and contributes to a reduction in inflammatory factors, thereby enhancing overall patient well-being.

The outcomes of this study indicated a notable reduction in the occurrences of disability, death, and vegetation through the utilization of the optimized emergency care pathway. This result implies that optimizing the emergency care pathway serves as a proactive approach, preparing patients for thorough emergency care even before hospital admission. This strategic preparation facilitates swift initiation of treatment upon patient arrival, enabling tailored treatment plans based on the patient's initial condition.

The optimized emergency care pathway is a holistic approach that encompasses the development of detailed resuscitation, treatment, and care plans, resulting in diminished prognosis incidence and enhanced nursing satisfaction. Consistent with the findings of the study conducted by Shuang et al.,[21] the results of our study revealed a high level of patient care satisfaction at 93.33% when employing an optimized emergency care pathway, surpassing that of the control group. The study outcomes strongly support the adoption and implementation of optimized emergency care pathways for stroke patients, emphasizing their positive influence on clinical and patient-centric aspects.

Study Limitations

Despite the valuable insights gained, this study has certain limitations that should be acknowledged. Firstly, the research was conducted within a specific hospital setting, potentially limiting the generalizability of findings to broader healthcare contexts. The sample size might impact the external validity of the results. Additionally, the retrospective nature of data collection poses inherent limitations, as it relies on pre-existing medical records, potentially overlooking nuanced details. Lastly, the study duration might not capture long-term effects, warranting further research to explore the sustained impacts of optimized emergency care pathways on stroke patient outcomes. Understanding these limitations is crucial for interpreting the study's findings and guiding future research.

CONCLUSION

In conclusion, this study provides compelling evidence supporting the efficacy of optimized emergency care pathways for stroke patients. Implementing this systematic and standardized care model significantly improved resuscitation outcomes, clinical results, and patient satisfaction. The pathway demonstrated its ability to reduce resuscitation and treatment times, contributing to enhanced prognosis and a notable decrease in disability, death, and vegetation rates. Moreover, the observed decrease in serum levels of inflammatory factors underscores the broader positive impact on patients' physiological responses. The study's findings suggest that adopting optimized emergency care pathways optimizes clinical outcomes and cultivates a more satisfactory patient experience. However, future research should investigate long-term effects and consider potential variations across diverse healthcare settings to validate further and refine the application of optimized emergency care pathways in stroke management.

COMPETING INTERESTS
The authors report no conflict of interest.

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AUTHOR CONTRBUTIONS

Jiucai Zhao and Maling Xiang contributed equally to this work.

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AVAILABILITY OF DATA AND MATERIALS

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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